The Electrical Industry's Weekly Magazine November 7, 1960

Electrical World

Price 50 Cents

A McGraw-Hill Publication

At Florida's Bird Key . . .

Underground Distribution Preserves Natural Beauty

. . . page 82

DATELINE:
HANFORD GENERATION
GETS ANOTHER
BLESSING . . . p 5

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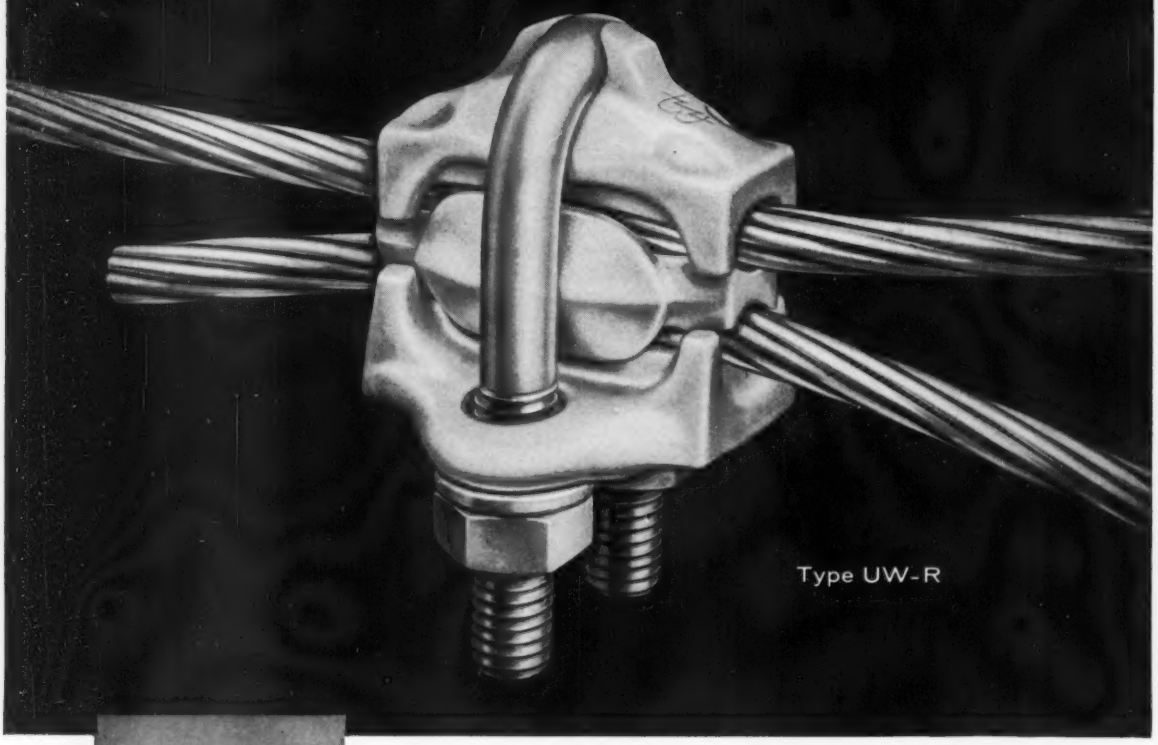
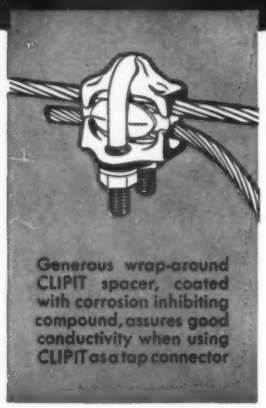
CLIPIT

low cost DEADEND for ACSR and Aluminum





Generous wrap-around CLIPIT spacer, coated with corrosion inhibiting compound, assures good conductivity when using CLIPIT as a tap connector

The high strength aluminum alloy CLIPIT deadend offers low cost, easy installation, wide range and versatility.
For reliable field performance, the CLIPIT, type UW-R, has these engineered features:

- Wide cable range: 2 sizes cover #6 thru 2/0 aluminum or 1/0 ACSR.
- High holding strength—CLIPITS exceed rated breaking strength of ACSR on most sizes.
- All parts of the CLIPIT are mutually self aligning.
- Captured, high strength, galvanized steel U-bolt permits high tightening torque.
- Wide belled cable entrances of CLIPIT reduce stress points and minimize cold flow. Ears of caps confine cables, prevent splaying.

CLIPIT— *another engineered solution to your connector problems by*

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Published for 86 years for those engaged in the business of generating, transmitting, distributing, or applying electric power

Electrical World

NOVEMBER 7, 1960

Vol. 154, No. 19

Electrical What in the World . . .

A man's normal working life is right around 40 years. Industry people now at the point of retirement entered the business, generally speaking, around the end of World War I.

Many youngsters being hired for the business now won't retire until after the year 2000. It is certain that they will be the marshals of many evolutionary and revolutionary changes.

Growth projections give a glimpse of the magnitude of the electric utility game by the turn of the century. A little imagination shows vividly that those power systems must be more radically different from today's than today's giants are different from the puny mites of First War vintage.

So what about the new utility or apparatus manufacturer employee, the executive of the future?

If he is to surmount the tasks facing him, he must be equipped with a lively, creative imagination, coupled with a venturesome spirit. Old approaches to new problems just will not be adequate.

Assuming the industry will get its share of capable, imaginative people, its job *then* is to make sure that the fetters of conventional approach are not imposed on them. It cannot afford to subdue their spirit.

To this end, this publication is dedicated. We feel a real responsibility to aid in enhancing the spirit of adventure which we are sure will be so vital.

Chuck Hochgesang

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NOW... a small, light, easy-to-install plastic control cable...

OKONITE P-30

small diameter plastic control cable

SMALL-CABLE SIZE, BIG-CABLE PERFORMANCE. That's the story on Okonite's new P-30—the multiple conductor cable designed especially for modern control systems where space is limited. Suitable for either a-c or d-c circuits, 600-volt rating, it's recommended for d-c circuits in wet locations and for temperature ranges to 75C. Rugged Okoseal jacket is moisture and flame resistant, provides a smooth surface for easy pulling.

Bare Annealed Copper
20-mil Okolene (polyethylene)
10-mil Color Coded Okoseal (polyvinylchloride compound)
Clear Mylar Tape
Protective Covering of Okoseal (polyvinylchloride compound)

To meet the trend toward lighter, more compact control systems in industry and utilities, Okonite now introduces P-30, a superior quality, small diameter, all-thermoplastic control cable. It's an ideal lightweight, general purpose cable for all types of installations—conduit, aerial, duct, tray, direct burial . . . in wet or dry locations.

Over 30% smaller and lighter than conventional-size rubber cables, Okonite P-30 nevertheless provides the kind of performance normally associated with many larger diameter cables. The multi-wall construction of P-30 offers three-fold electrical protection, since both the two protective coverings and the basic insulation are high quality dielectrics.

P-30 is especially suited for use under rigorous conditions. Double-wall construction provides excellent resistance to the chemical attacks of oils, acids, alkalies and other materials. The protective jacket of Okoseal—extruded over the cable assembly—assures a moisture- and flame-resistant covering.

Another example of Okonite *Cable'bility** in action . . . P-30 is designed to give years of trouble-free service on vital installations. For complete details, write for Bulletin 1140, The Okonite Company, Subsidiary of Kennecott Copper Corporation, Dept. EW, Passaic, New Jersey. 7963

*Okonite Cable'bility... Cable Craftsmanship since 1878.

where there's electrical power . . . there's

OKONITE CABLE

Letters

Summer Peaks Came Late

To the Editor:

Your tabulations on peak loads of various electric utility systems in summer and winter have been very interesting to me for the reason of my special work on calculating reserve-generating-capability requirements, as well as my interest in the progress of the utility business.

The article on pages 64 and 65 of the Sept. 26 issue of *Electrical World* was to cover "summer peak loads" for 1960. As I understand it, it actually covered data prior to Labor Day. The result was that the tabulated data were misleading in at least two cases, because of the effects of having a long hot spell which ended a few days after Labor Day.

For the Commonwealth Edison Co, the summer peak was 4,590 Mw (on Sept. 8), instead of the 4,549 Mw (on Sept. 1) which is given in your table. For another utility, I understand the peak load just after Labor Day was 3% above your figure.

Herman Halperin
Commonwealth Edison Co

A Distinction and a Difference

To the Editor:

I note with a great deal of interest in the Oct. 3 issue of *Electrical World* your decision to abandon the column, "Politics and Public Power," and your reason for doing so. As you undoubtedly know, I am heartily in favor of this move.

You go on to say that *"Electrical World* was—and of course, still is—firmly aligned on the side of the investor-owned utilities in their struggle against the federal government's encroachment into the power business." You fail to make the necessary distinction—as *Electrical World* apparently always has—between "federal government" and locally-owned and locally-controlled public power systems. I am sure you are fully aware of the distinction and I believe you ought to recognize it.

At any rate, congratulations. I like the new "Dateline . . ." approach much better.

D. J. DeBoer, executive manager
Nebraska Public Power System

▶Thank you very much. Your good letter helped move us to write the editorial last week.

Dateline . . .

Hanford, Wash.—The R. W. Beck & Associates report to the Joint Committee on Atomic Energy has finally concluded, presumably, all there is to be concluded about the technical and economic basis of adding electric generating facilities to the Hanford New Plutonium Production Reactor (NPR).

As the fourth major NPR review in less than three years, the Beck report says the economic analysis on which convertibility features were authorized by Congress in August, 1958, are still valid. For 85 different methods of combining government financing arrangements, uranium fuel costs and plutonium (Pu) production periods, the report consistently found in all cases savings to the government in Pu-production. Savings if 700 Mw of by-product electricity were generated by NPR—over costs of Pu from a single-purpose reactor— ranged from 14 to 92% per gram of Pu. Actual cash savings are based on Pu cost estimates furnished by AEC (and a government "price" of $12 per gram), and appear in the classified second part of the two-volume report.

Beck and his associates (Herbert C. Westfall and William E. Trommerhausen, all registered professional engineers in the state of Washington) were instructed by JCAE last December to determine whether market values of NPR by-product electricity integrated into the Bonneville grid would:

1. Amortize capital cost of the electric generating facilities;

2. Pay for costs "properly assignable or chargeable" to power as incremental NPR costs (operation, labor, materials, etc., due to generation);

3. Contribute to a reduction in government cost of producing Pu from NPR as now authorized ($145-million for total construction costs, including estimated $25-million for convertibility features).

JCAE asked Beck to exclude costs for interest on investment and fuel inventory, process development

(*Continued on page* 81)

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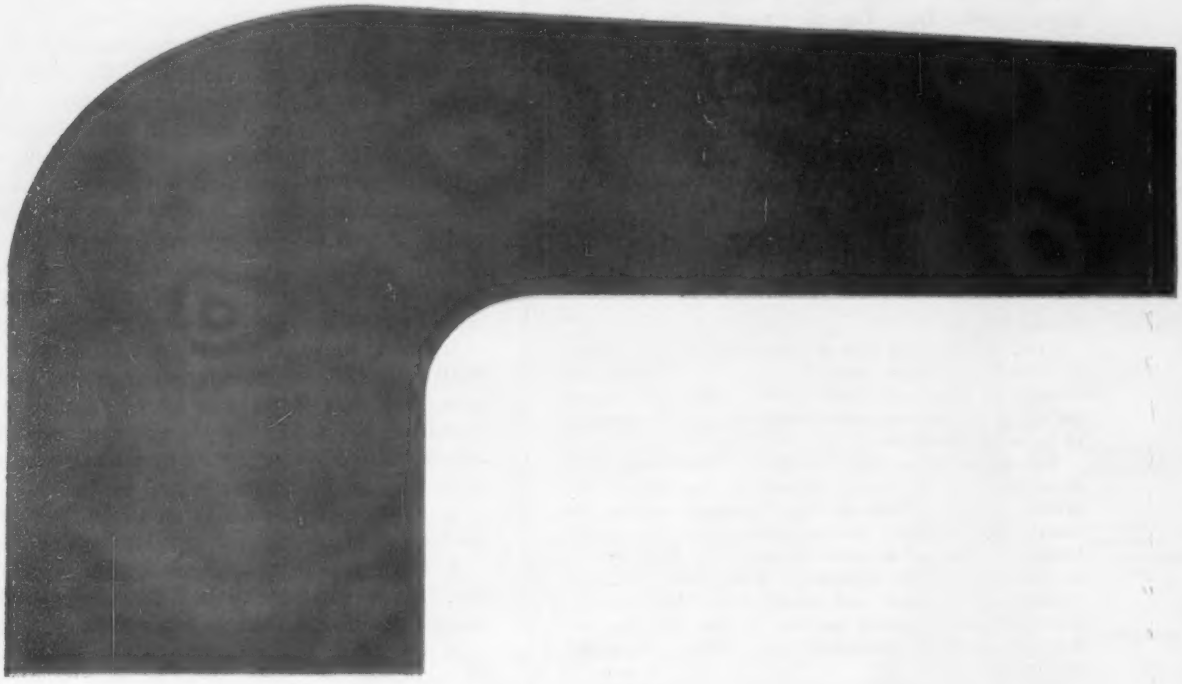
GAS TEMPERING

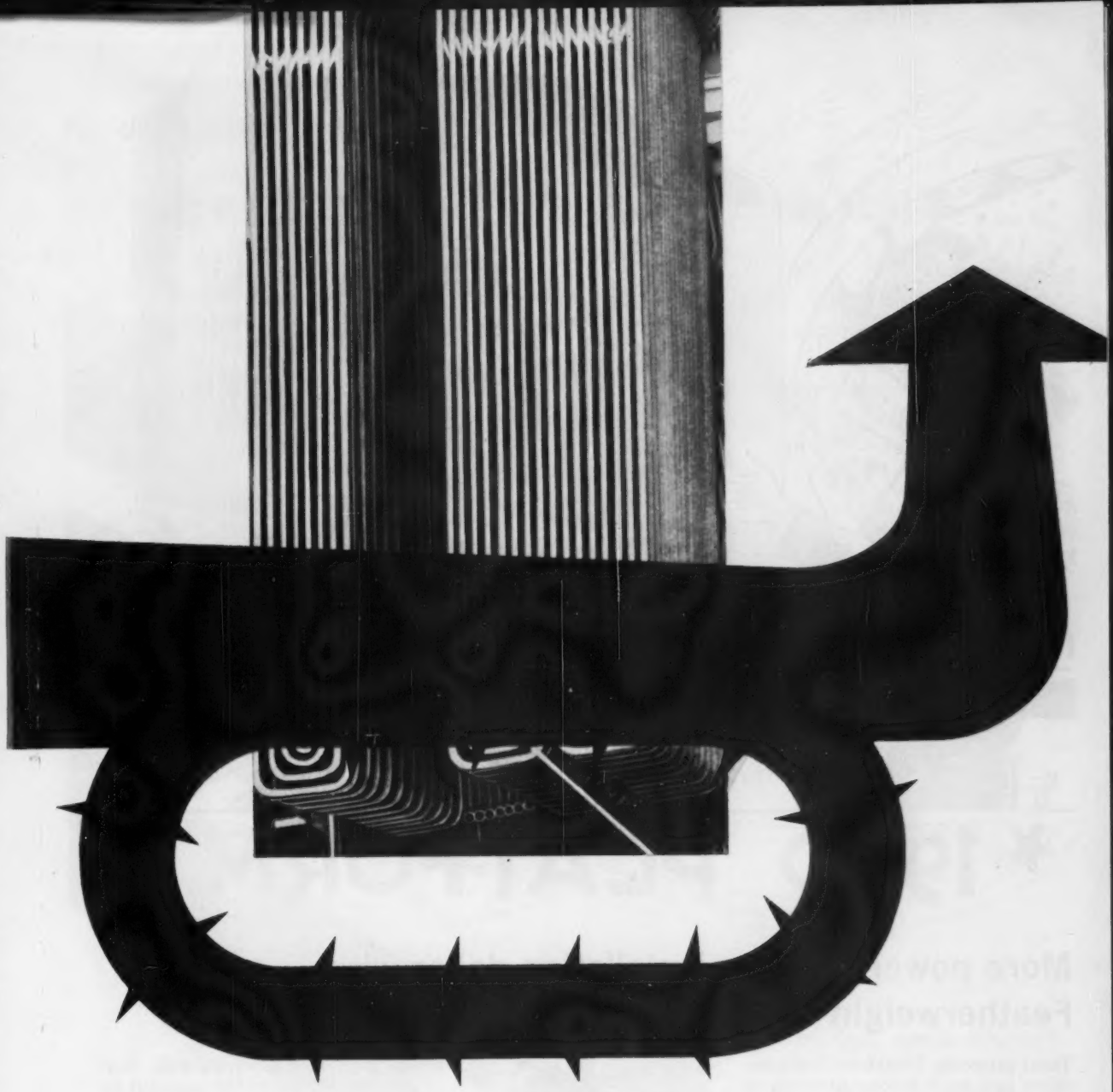
...its role in superheater protection



B&W perfected control principle supplies needed heat volume at lowered gas temperature . . . cuts superheater alloy requirements and reduces maintenance.

What is Gas Tempering? Gas Tempering is the introduction near the furnace exit of "cool" flue gases to mix with —and thus control—the temperature of furnace gases entering the superheater.

Though these cooler flue gases appreciably lower furnace exit gas temperature, total furnace or convection-pass heat absorption is little affected since weight and quantity of gas are increased.



How does Gas Tempering protect the superheater? The lower temperature of the gases entering the convection section a) greatly reduces ash fouling, corrosion and creep of the tube surfaces in the superheater, b) prevents "enameling" of ash on superheater tubes, c) reduces requirements for high alloys in superheater tubes, necessary with higher gas temperature.

Has Gas Tempering been proved in operation? YES! . . . Major B&W boiler installations all over the country are reporting excellent results with Gas Tempering. What's more, Gas Tempering has offered them many other important operating advantages in addition to superheater protection.

For the complete story on Gas Tempering—its relation to boiler design and operation plus typical case histories—write for B&W Bulletin G-96. The Babcock & Wilcox Company, Boiler Division, Barberton, Ohio.

G-977

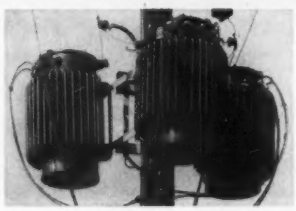
B&W

THE BABCOCK & WILCOX COMPANY

BOILER DIVISION

More power for your installation dollar with Featherweight Pole Star® Distribution Transformers

Total capacity: 1000 kva! Just a few years ago, such a concentration of power in a single overhead installation would have been impracticable. Today, it is easily accomplished with Featherweight Pole Star Distribution Transformers—using poles and platform materials that are the equivalent of those required for roughly *half* as much capacity in the early fifties. In addition to platform installations, some utilities now place as much as 500 to 750 kva on a single pole, by cluster-mounting three transformers.



The trend toward more kva per pound and per cubic foot has gained considerable impetus in recent years, since the "breakthrough" made in 1953 with introduction of the 167-kva Featherweight Pole Star—the first distribution transformer above 100 kva to be designed for pole mounting. It was followed with a 250-kva unit.

This year, Pennsylvania's Pole Star Featherweight design was extended to 333 kva. Besides encouraging high-capacity platform installations such as that shown, the new 333-kva Featherweight Pole Star is suitable for mounting on either a 45-foot Class 3 or 35-foot Class 4 southern pine or douglas fir pole. Thus, Pennsylvania has *tripled* the practical limit for single-transformer pole mounting in just seven years.

Bulletin D-560 gives weights, dimensions, electrical data, and design and construction details of the complete line of Featherweight Pole Star Distribution Transformers. For a copy—or a quotation on specific requirements—contact Distribution Sales Department, Pennsylvania Transformer Division, McGraw-Edison Company, Box 330, Canonsburg, Pennsylvania.

McGRAW-EDISON

PENNSYLVANIA POLE STAR DISTRIBUTION TRANSFORMERS

For dependable protection of electrical wiring . . .

USE RIGID STEEL CONDUIT

When you install rigid conduit made of steel, you obtain *permanent* protection against the ever-present hazards of faulty electrical circuits.

The proof is in the performance of thousands of steel conduit installations over the past 50 years. And the reasons are simple:

Strength and toughness

Steel prevents physical damage to the wires, protecting them permanently.

Good electrical conductivity

Steel carries off dangerous fault currents to remove the threat of fire and shock.

Heat resistance

Steel conduit prevents possible fire from spreading to the building.

Rigid steel conduit is inexpensive to buy, easy to install, simple to rewire. It's compatible with all construction materials in major use, and will often outlast the building itself. Ask your nearest electrical distributor for full details.

BETHLEHEM STEEL COMPANY
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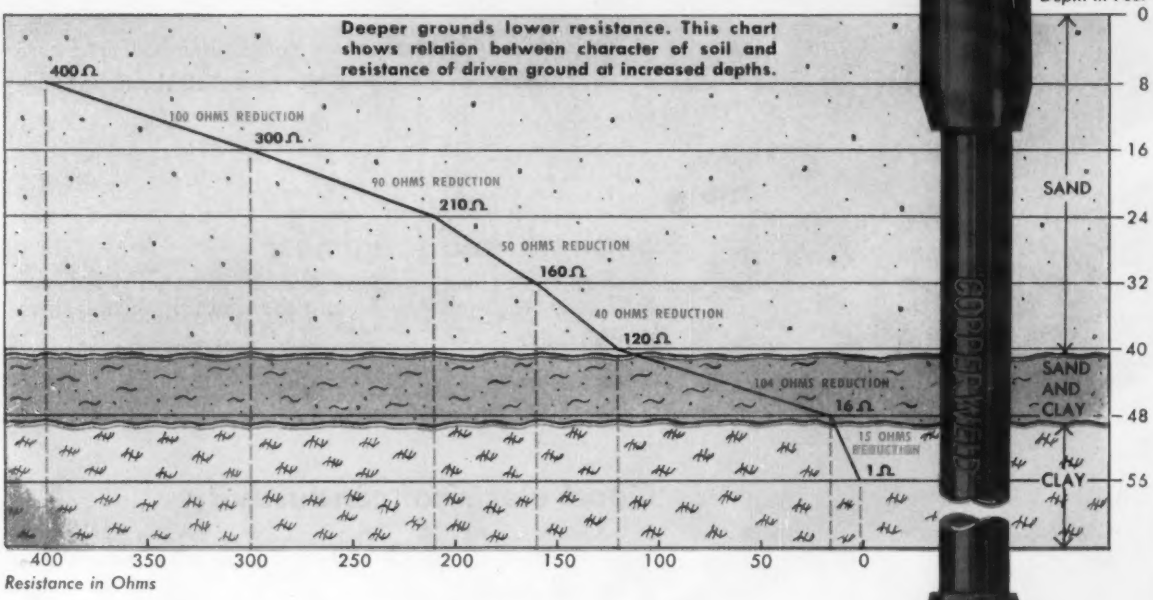
FOR SAFE GROUNDING . . .

DRIVE DEEP!

TO LOW-RESISTANCE SOIL

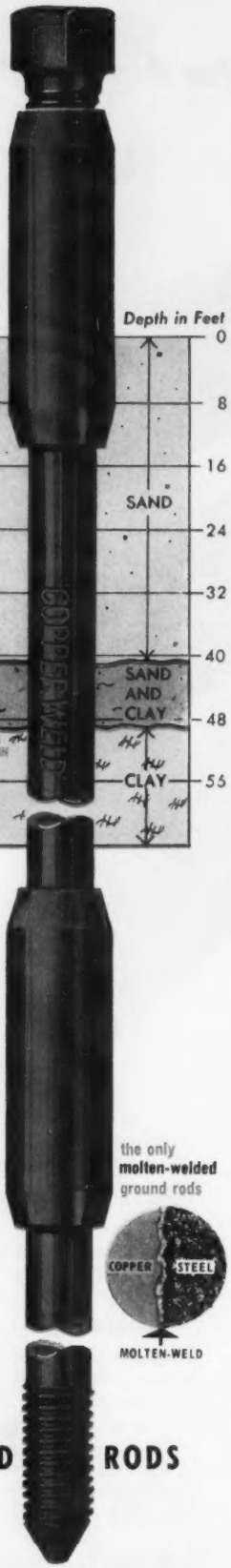


In many areas the surface layer of soil has such high resistance that standard 8- or 10-foot ground rods cannot provide suitable low-resistance ground connections. In such areas, dependable, low-resistance grounds may be obtained by driving sectional ground rods deep into the earth to reach good-conducting soil.

Copperweld Sectional Ground Rods are ideal for deep driving. Their tough core of alloy steel provides strength and rigidity for driving in all types of earth. You can drive as many of these sectional rods as needed to reach low-resistance soil. Each section is joined to the other by a bronze coupling, eliminating the danger of corrosion and poor electrical connections. And once they're installed, Copperweld Sectional Rods are in to stay . . . the heavy copper covering over the entire rod, including the threaded ends, provides permanent protection against rusting.

For tops in safety, improved line performance and reduced service interruptions, drive deep with Copperweld Sectional Ground Rods.

Look for the name "COPPERWELD." For your protection, it is stamped on every Copperweld Ground Rod.



the only **molten-welded** ground rods

Copperweld® **SECTIONAL GROUND RODS**

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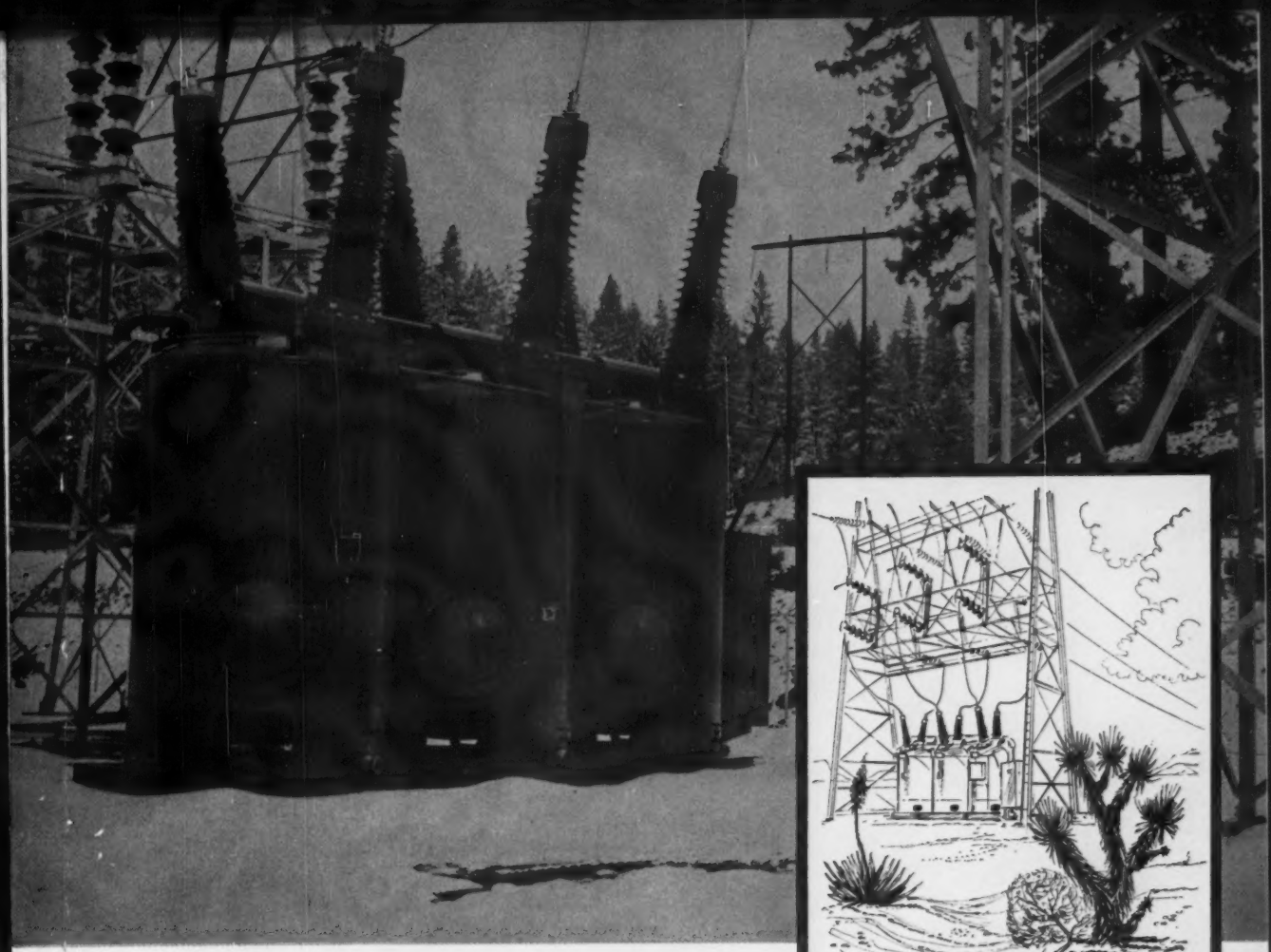
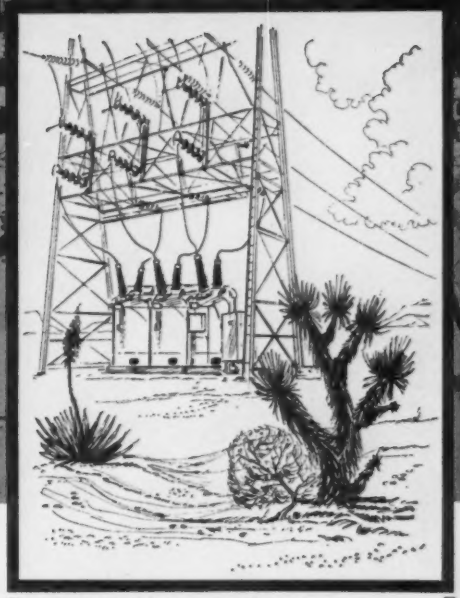




I-T-E installations stand up daily to the ravages of —

- the windswept Western deserts
- the freezing Rockies and High Sierras
- the salty Pacific coastline
- the wet forests of the great Northwest

FROM SNOW AND ICE TO SCORCHING SUN...

You'll find field-proven Power Circuit Breakers by I-T-E

For more than 50 years, Kelman power circuit breakers have proved themselves the hard way—successfully standing up under the most rugged environments. Under all kinds of adverse conditions, from snow and ice to desert sand and sun, from whipping rains to fast-changing mountain temperatures, thousands of Kelman breakers have weathered the years and stood the test of time.

Now part of I-T-E's broad line of established electrical equipment, the latest improved oil breakers from the Power Circuit Breaker Division are offered nationally through all I-T-E sales offices. Available in transmission, subtransmission, and distribution ratings, these breakers stand ready to serve under any conditions anywhere in the United States.

For descriptive literature on I-T-E's field-proven power circuit breakers, write to 1667 North Main Street, Los Angeles 12, Calif., Dept. EWO-961-3.

I-T-E CIRCUIT BREAKER COMPANY
KELMAN POWER CIRCUIT BREAKER DIVISION

Blaze a smaller path!

Running a power line through a dense tree area can be a costly job!

With open-wire systems, the path you clear must be a broad one. Otherwise extra-long poles are necessary. Either way costs you plenty.

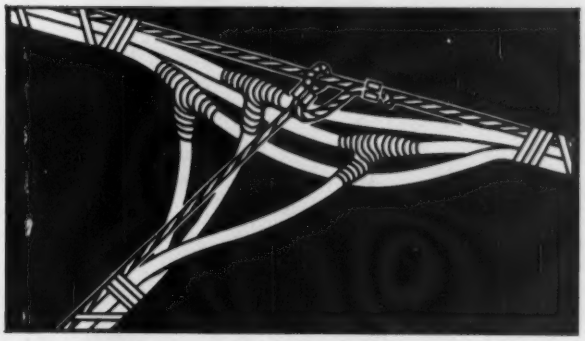
With Rome's reverse-lay preassembled aerial power cable, less tree clearance is required, so you do less tree trimming—initially *and* periodically. Rome aerial cable has a built-in, high-strength messenger for staunch support—capable of supporting falling branches and even trees.

For instance—you need not clear as much of a right of way *initially* as you would for open-wire systems. And you can put off *periodic* tree trimming for as long as five years, compared to the normal two-year requirement for open-wire systems.

Because each conductor is fully insulated and jacketed for maximum resistance to moisture and tree abrasion, reverse-lay aerial cable reduces the chance of outages during storms and high winds. There's no chance that wet branches will cause shorting between phases. And it's safer for your line crews to handle during storms . . . safer for the public too!

In residential areas, preassembled aerial cable gives you two *more* advantages. You avoid situations in which the public might feel you are "defacing" property by excessive tree trimming. And, because it's compact, aerial cable makes a neat, uncluttered appearance—less likely to bring complaints.

You can get Rome's preassembled reverse-lay aerial power cable in a wide range of constructions, rated up to 15 KV: Rozone (oil-base) or Rozone A (butyl-base) insulation, Roprene (polychloroprene) or Roseal (flame-retardant polyethylene) jacketing. Mail the coupon, now!



EASE OF TAPPING Long spans sometimes make mid-span tapping necessary. Rome's reverse-lay preassembled aerial cable construction—where the direction of lay of conductors is reversed at regular intervals along the line—permits easy mid-span tapping. The reversed portions provide sufficient "slack" for taps *anywhere* along the line! This eliminates the necessity of making taps at the pole ends only. Stress is carried entirely on the messenger. Conductors can be untwisted for tapping without cutting—even while the line is hot! Your linemen can use wire guards and rubber blankets for safety and make pole-end taps without use of a platform.

BETTER VOLTAGE REGULATION Because of its close geometric spacing as compared with open-wire circuits, aerial cable has a lower reactance. Voltage drop is about half as great as typical crossarm construction and, for a given voltage drop, power can be transmitted twice as far.

ROME CABLE
DIVISION OF **ALCOA**

Dept. 1-110, Rome, Y.

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Name .....

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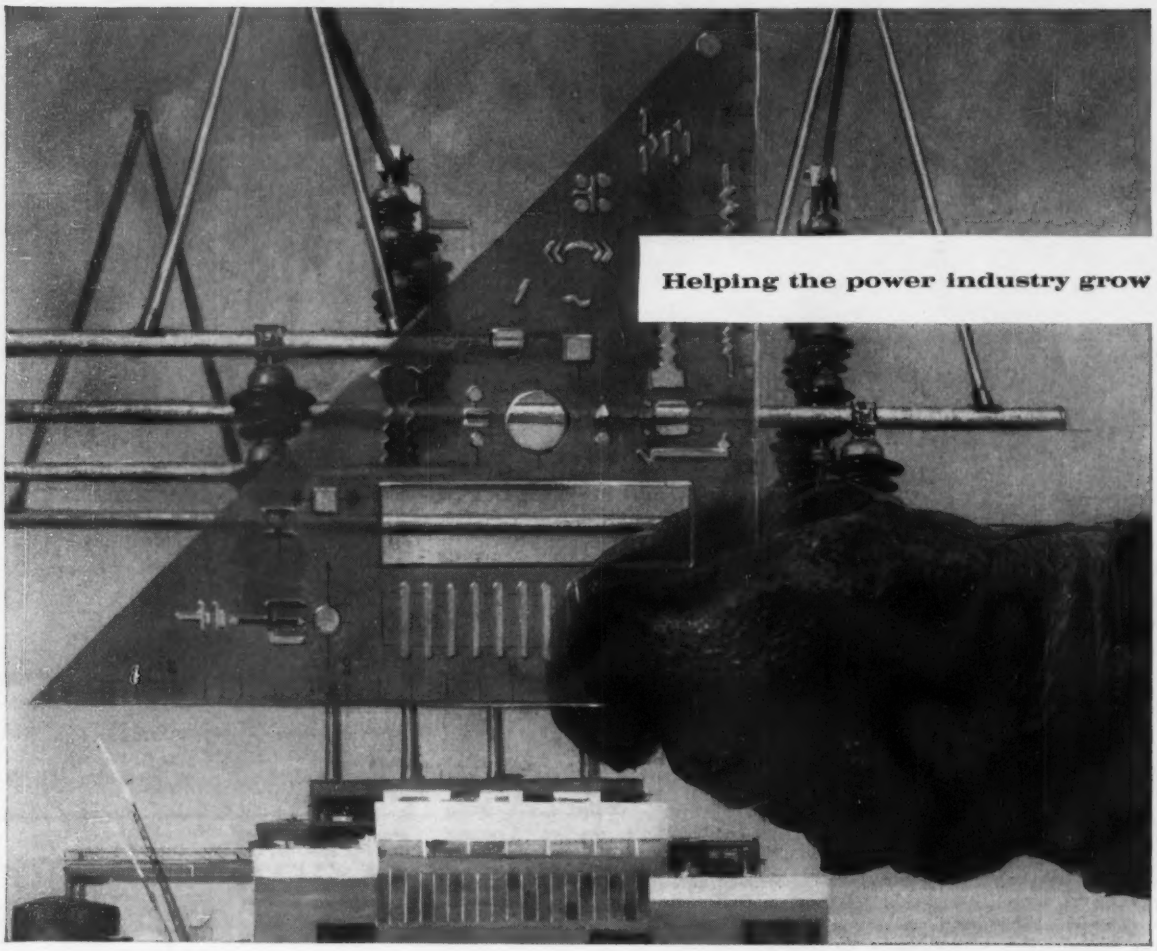
ALCOA
ROME CABLE
DIVISION

Hand of a craftsman

The hand of a craftsman grasps a template used by engineers and designers in translating design; in the background an intricate power installation nears completion. United Engineers has served pace-setting utilities and industrial organizations on such projects as thermal and hydroelectric plants, electric substations, and installations for supplying heating and process steam. Each presented its own technical problems—each was successfully solved on schedule and within estimate. Our skills and creativity can augment your engineering staff as required. Our background of 75 years' experience as designers, construction engineers, and engineering consultants can pay you substantial dividends.

Painting by Stanley Meltzoff



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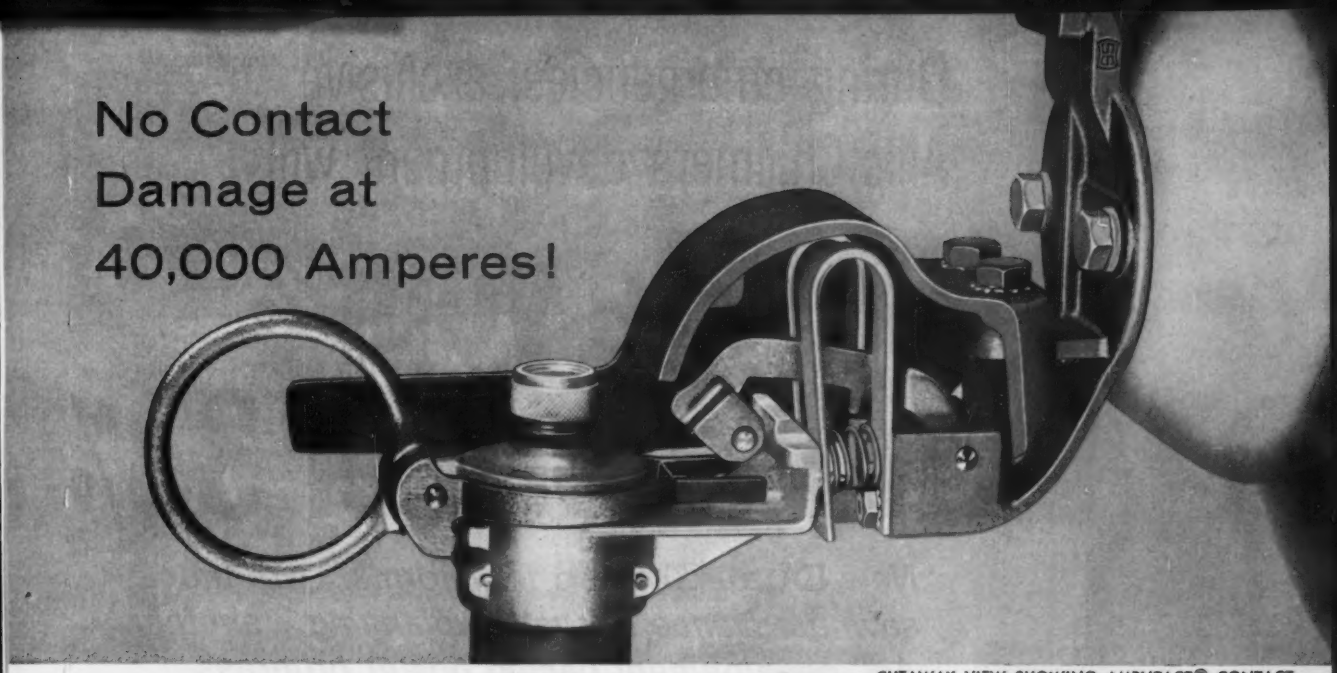


CUTAWAY VIEW SHOWING AMPLITACT® CONTACT

SOUTHERN STATES' POWER FUSES EMPLOY AMPLITACT® CONTACTS TO PREVENT CONTACT DAMAGE

Now, for the first time, "switch-proved" Amplitact® contacts are used on Southern States power fuses. Repeated tests at current ratings up to 40,000 amperes show no contact damage.

Used successfully for many years on Southern States air switches, Amplitact® contacts are now used on the new BPA and HPA Power Fuses.

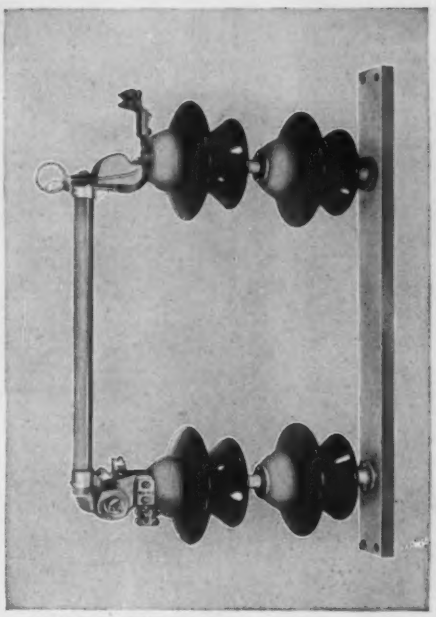
The Amplitact® harnesses electromagnetic forces generated on a high fault, increasing contact pressure when it is needed most.

While contact damage under extremely high fault currents has been more irksome than serious, the Amplitact® eliminates any possibility of damage.

These new power fuses have all of the outstanding advancements of the BP, MP, and HP power fuses introduced by Southern States in 1959—plus the reverse-loop contact. They have expendable cap fuse holders to provide dependable clearance of high or low current faults. Fuse holders are designed for easier handling and are equipped with a large operating eye. A stationary sleet shield gives better protection against icing and provides guidance when the fuse is slammed closed.

Low cost refusing in the field is accomplished with easy-to-use fuse kits.

Get your Southern States representative to give you full information about this important development in power fuses, or write direct for Bulletin 60 PF.



TYPE HPA POWER FUSE

KEEP PACE WITH ELECTRICITY

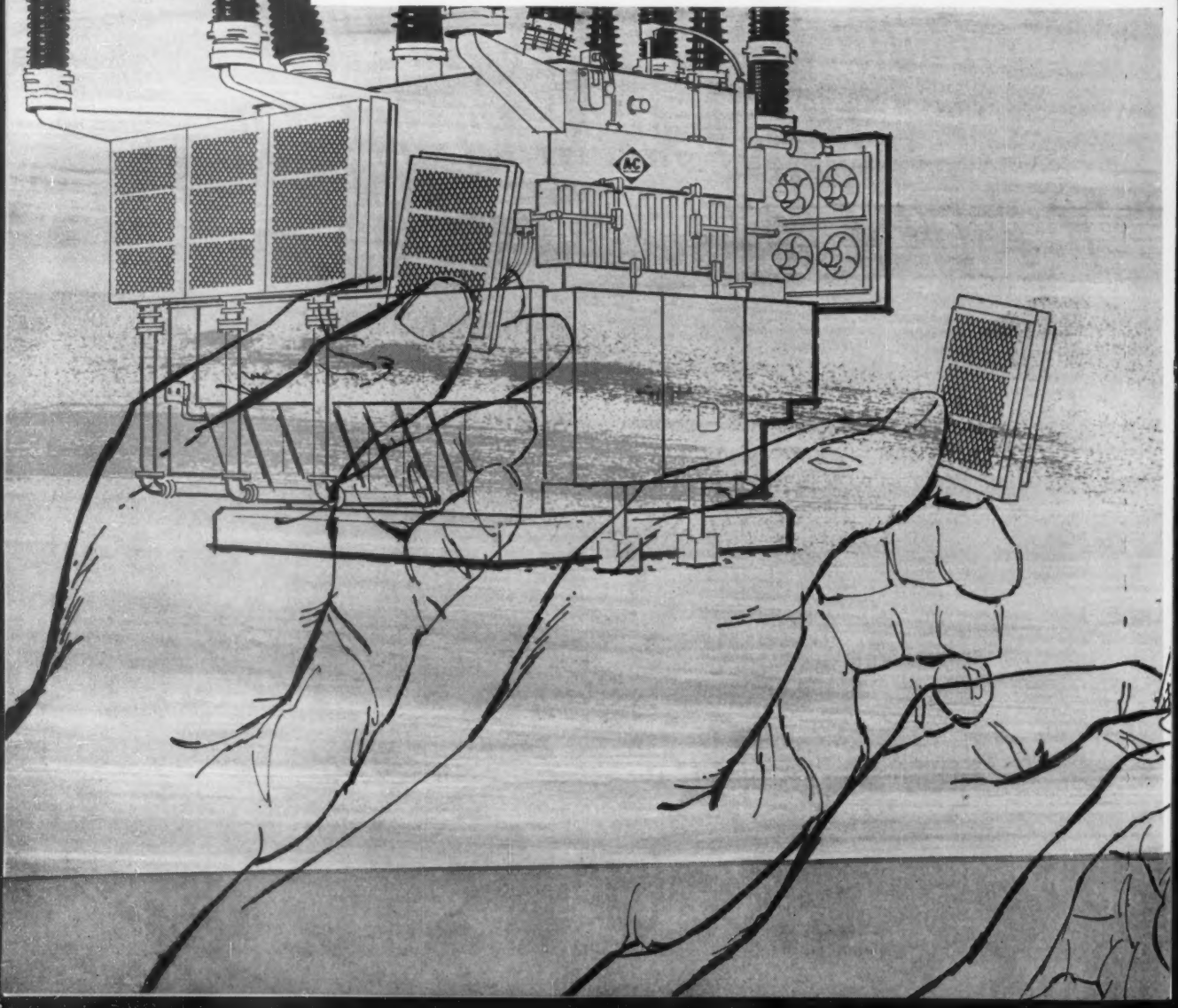
IN CANADA
Dominion Cutout Co., Ltd., Toronto

SOUTHERN STATES
EQUIPMENT CORP.
HAMPTON, GEORGIA

During emergencies, exclusive Allis-Chalmers development will

uprate your transformer 33%

New **Dual-Cooled** *transformers are money-saving advance in system planning... another A-C development pacing power progress*



Pictured here is a *Dual-Cooled* power transformer — the first of two required for Wisconsin Electric Power Company's Blue Mound Station. It's proof that you can now buy *smaller* transformers instead of paying for largely unused standby capacity.

WEPCO takes advantage of both dual-cooling and low ambient temperatures to carry projected peak loads during an outage of one transformer. This means they can buy minimum size transformers — 290 mva — all that is needed during normal operating conditions throughout most of the year.

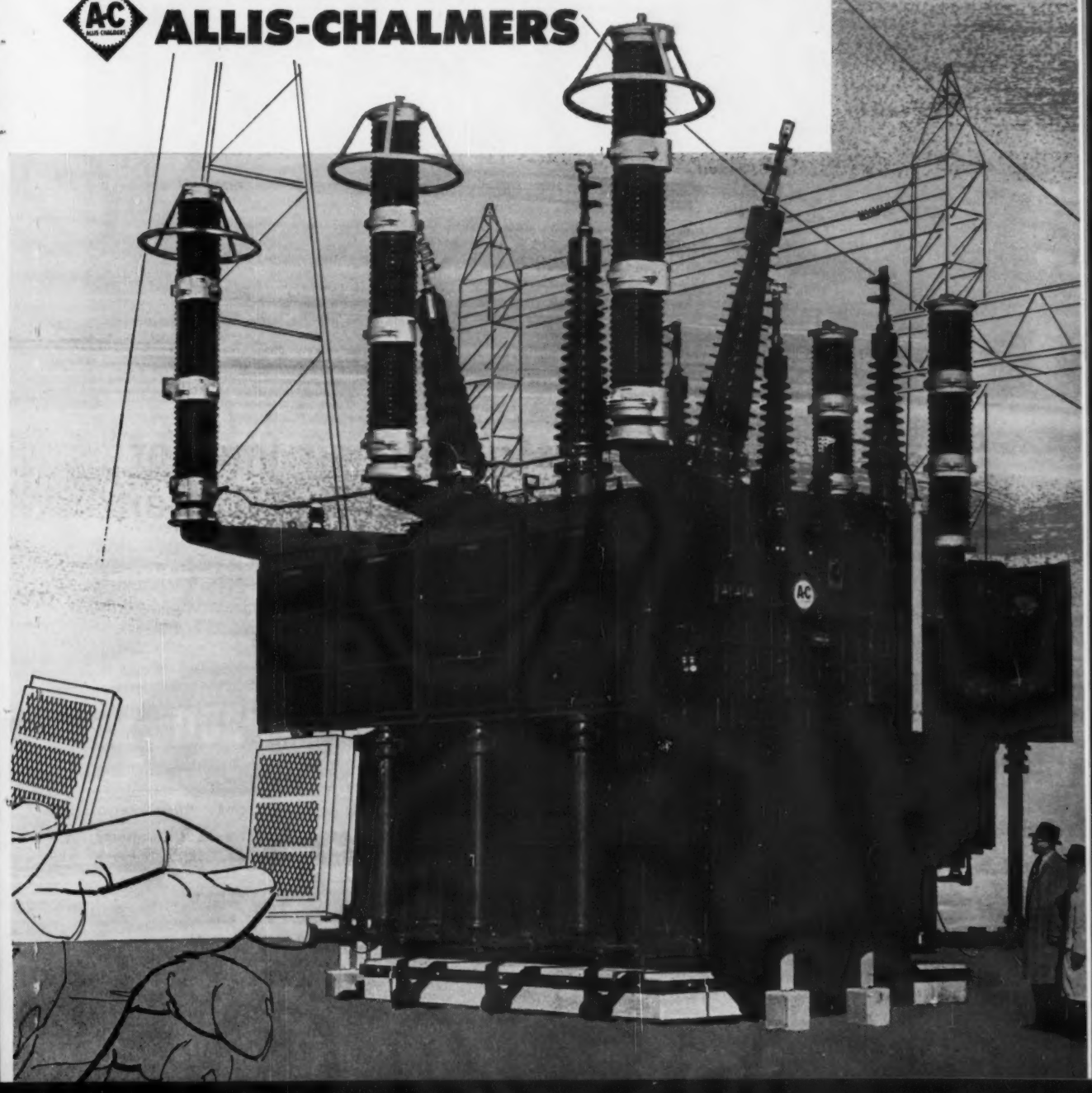
However, during an outage of one unit, 460-mva can be carried by a second transformer at 32 F ambient air temperature. This 460-mva rating (somewhat less at higher ambient air temperatures) is achieved by adding *Electro-Coolers* from the idle transformer. Exchange is made practical *and* without service interruption by use of manual shutoff valves located in each cooler pipe.

You can get Dual-Cooled *transformers in any rating from 20,000 kva up. For full information, contact your nearby A-C office or write* **Allis-Chalmers,** *Power Equipment Division, Milwaukee 1, Wis.*

A-1286

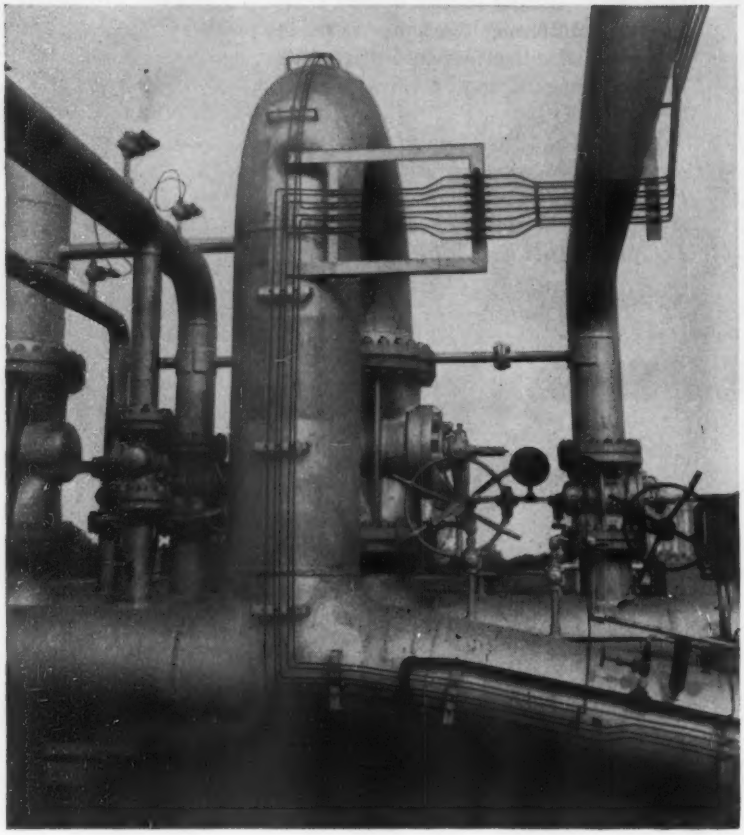
Dual-Cooled and Electro-Cooler are Allis-Chalmers trademarks.

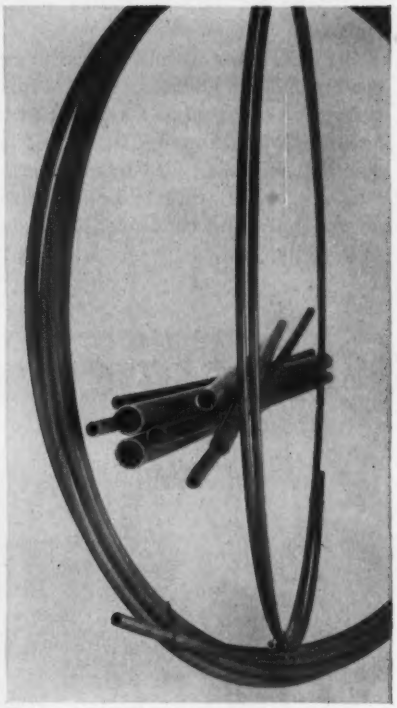
ALLIS-CHALMERS



Another new development using

B.F.Goodrich Chemical *raw materials*





Extron "Tuff-Tube" corrosion-resistant, high-pressure tubing is manufactured of rigid Geon by Extron Corporation, Knoxville, Tennessee, and is used for process plant application like the one shown here. Sizes range from 1/4" thru 3/4" O.D. B.F.Goodrich Chemical Company supplies the Geon rigid vinyl.

Small process and instrument air lines of rigid Geon cut both the cost and corrosion

Corrosion — and cost — are frequent problems in the miles of small process, sample, purge and instrument air lines in chemical operations. One way to beat corrosion—and cut maintenance—is to buy lines of high-priced metals. Now there is a way to get tubing with necessary high pressure properties without going to expensive metals. This tubing is being made of rigid Geon vinyl.

Rigid Geon is ideal for this kind of operation. It resists most chemicals, hydrocarbons, oxidation or atmospheric conditions. At the same time it provides impact resistance and tensile strength far beyond this application's needs. Besides being reasonable in cost, rigid Geon tubing is easy to install, light in weight. It comes in different sizes and has color compounded in for installations where color-coding may be desirable.

Here's another example of how Geon improves a product, sometimes opening whole new markets or areas of application. For more information, write Department GX-12, B.F.Goodrich Chemical Company, 3135 Euclid Avenue, Cleveland 15, Ohio. Cable address: Goodchemco. In Canada: Kitchener, Ontario.

A TRADE MARK OF B.F.GOODRICH CHEMICAL COMPANY
Geon
VINYLS
A DIVISION OF THE B.F.GOODRICH COMPANY

B.F.Goodrich Chemical Company
a division of The B.F.Goodrich Company

B.F.Goodrich GEON vinyls • HYCAR rubber and latex • GOOD-RITE chemicals and plasticizers

You're watching a motor starter "blow up" in the Allen-Bradley high current laboratory.

...to make Allen-Bradley the most reliable motor control you can buy

This Allen-Bradley laboratory engineer has just subjected another motor control device to far more current than it would ever encounter in ordinary service. Such tests demonstrate the plus values in A-B motor control . . . your assurance of dependability—at maximum ratings—under any operating conditions it may encounter.

Reliability, performance, adequate "capacity" and "safety" testing is an important part in the production of A-B motor control. Not content with "spot checking" of parts and components—tests and retests are routine procedure in the Allen-Bradley plant. Consequently, *we* know that *you* are going to get *more millions* of trouble free operations when you specify—and use—Allen-Bradley quality motor control.

A-B QUALITY

A-B BULLETIN 709 ACROSS-THE-LINE SOLENOID STARTERS

A-B solenoid starters designed with only ONE moving part, double break, silver alloy contacts, and permanently accurate overload relays, are made in 9 sizes with ratings up to 450 hp, 220v; 900 hp, 440-550 v.

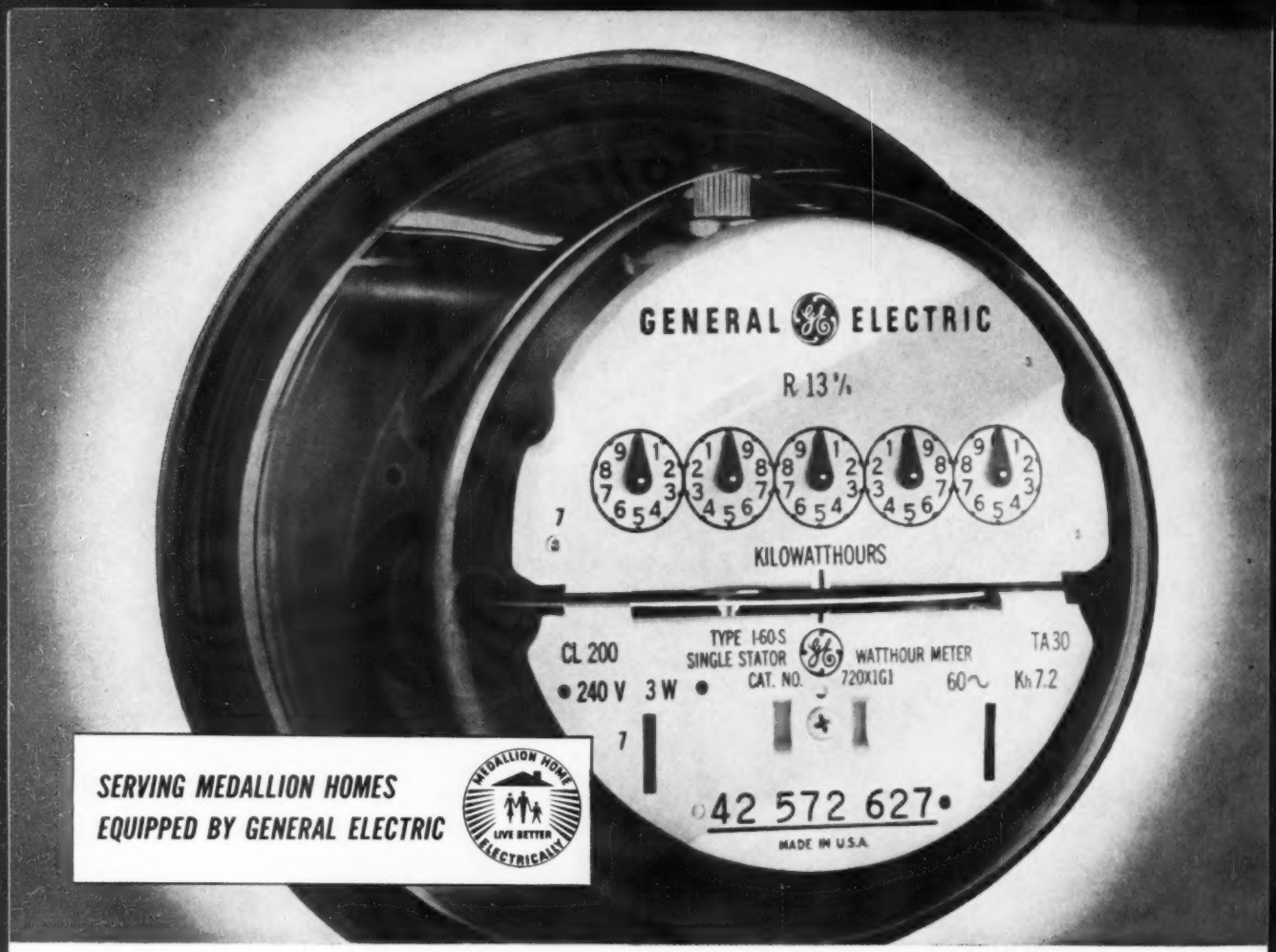
Allen-Bradley also makes a full line of quality high voltage control.

ALLEN-BRADLEY

MEMBER OF NEMA

Quality Motor Control

Allen-Bradley Co., 1327 S. First St., Milwaukee 4, Wis. • In Canada: Allen-Bradley Canada Ltd., Galt, Ont.



Today's purchase of each General Electric I-60 provides . . .

Up to 83¢ in EXTRA VALUE by

Each General Electric single-phase meter with magnetic suspension put in service today can save you up to $0.83 in present worth, $1.98 in gross maintenance costs over 15 years . . . here's proof:

Ball bearings in ordinary meters wear, causing loss of accuracy and revenue. Replacement—in a comparatively short time—is necessary for efficient, economical operation. *Bearing replacement is costly.*

Here's a typical example. Assume replacement occurs after 15 years' service. Then, consider these replacement maintenance costs: $0.90 per meter, net cost for parts; $0.33 per meter, average labor cost; $0.75 per meter, average cost for handling and recalibrating. *These replacement costs total $1.98 per meter.* Using a present worth factor of six percent interest for each of the 15 years, the conservative cost of bearing replacement on each ball-bearing meter would be $0.83.

General Electric single-phase—and polyphase—meters with magnetic suspension have *no bearings to wear out or replace*—no measurable bearing wear after the equivalent of 300 years of normal service. In fact, of nearly 12,000,000 G-E magnetic suspension meters now in service, not one has ever been replaced because of bearing wear. This is proved reliability.

Now, multiply the $0.83 figure calculated by the number of ball-bearing meters you have in service . . . and see why, *in metering, anything less than the best is too costly.*

For additional information, contact your General Electric Sales Engineer. Or write General Electric Co., Somersworth, N. H.

713-03

In metering, anything less than the best is too costly

Present Worth Savings From No Bearing Wear

Eliminating Bearing Replacement

METER DEPARTMENT

GENERAL ELECTRIC

BY PARSONS

PARSONS

Parsons provides experienced electrical, mechanical, and structural design and construction for modern power plants, under the guidance of skilled management. For your project – large or small – it will pay you to look to Parsons for power.

The Ralph M. Parsons Company, Los Angeles. United States Offices: Pasadena, Houston, Huntsville, New York, Washington. International Offices: Asmara, Bangkok, Beirut, Cairo, Calgary, Dacca, Djakarta, Jeddah, Karachi, London, New Delhi, Paris, Teheran, Tokyo, Toronto.

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Electrical World

NOVEMBER 7, 1960
Vol. 154, No. 19

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The Electrical Week

LATE NEWS ▶ **Behind-the-scenes conferences between prosecution and defense** lawyers leave the fate of the postponed power switchgear assemblies Philadelphia antitrust trial hanging in the air. Federal Judge J. Cullen Ganey who is expected to preside over the trial says he now expects it to begin Nov. 9 after pre-trial negotiations on the scope of testimony are completed.

But in Washington, where some of the conferences have included Antitrust Chief Robert Bicks, there were unconfirmed reports that much more was at stake in these negotiations. The conferences have also involved counsel for defendants in all the other 19 indictments. Observers felt that perhaps the Justice Department was willing to settle for consent decrees in the civil cases, provided the wording of the decrees involved an admission of guilt. This would make defendants more easily liable to third-party damage suits. It also presupposes that criminal trials would be cancelled with (1) defendants changing their pleas to nolo contendere, and (2) the judge accepting such pleas. But with tight secrecy surrounding the negotiations, none of the conjectures could be substantiated, as *Electrical World* went to press.

Local power issues on tomorrow's ballot: Louisianans will vote on constitutional amendment permitting the state to loan the Sabine River Authority $15 million to start the Toledo Bend Dam project. Project would provide 67.7 million kwhr of prime power, 139.5 million kwhr of secondary power. Under proposal, Authority can sell to investor-owned companies but can't build distribution facilities . . . Greenfield, Ohio, voters will act on initiative to accept Dayton P&L $1,125,341 offer for 2.7-Mw municipal plant serving 2,100 meters. Consultant hired by local Board of Public Affairs claims plant is worth more than offer . . . Washington state voters will pass on Sportmen's Council initiative to block Tacoma City Light from building dams over 25 ft high on Cowlitz River or other Columbia tributaries below McNary Dam.

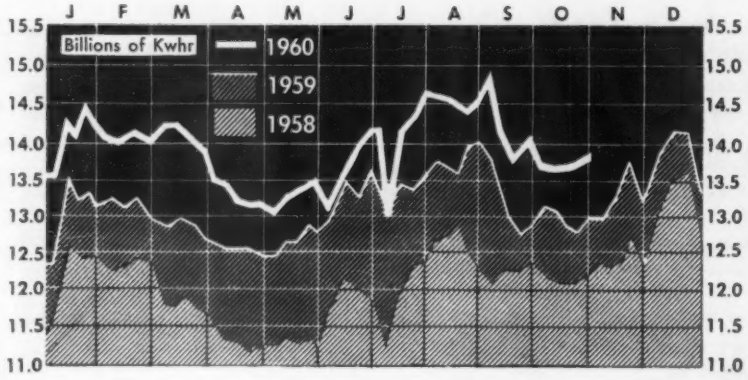
Utility rate trouble may be anticipated in Ohio. Don T. Hostettler, mayor of Ashland, has put out a call to 80 cities to meet Nov. 16 in Ashland. Purpose is to get cities to bargain collectively on electric and gas rates.

Negotiators for Ohio Edison Co and seven IBEW locals reach agreement on a two-year contract. Terms include a 4% wage increase the first year in steps from 7½¢ to 13¢ an hour. Second year increase will range from 7 to 14¢ an hour.

Obituary—O. Titus, 67, president of Metropolitan Edison Co, Reading, Pa.

WEEKLY POWER OUTPUT—Up 7.0%

(Week ending Oct. 29), Kwhr 13,883,000,000



Per Cent Change From Previous Year

	Oct. 15	Oct. 22	Oct. 29
Total U. S.	+ 6.9	+ 8.2	+ 7.0
New Eng.	+ 3.0	+ 4.4	+ 3.9
Mid. Atlan.	+ 4.1	+ 5.8	+ 5.5
Cent. Indust.	+ 6.8	+ 7.8	+ 6.8
West Cent.	+ 8.1	+10.2	+ 7.8
Southeast	+ 4.7	+ 9.3	+ 6.9
South Cent.	+ 9.8	+10.6	+ 9.2
Rocky Mount.	+14.9	+ 9.5	+ 8.1
Pacific			
NW	+11.3	+ 6.5	+ 6.1
SW	+ 8.2	+ 9.6	+ 9.6

Seasonally Adjusted Index 272.6

Week Ago 271.9 Year Ago 249.3

Source: Edison Electric Institute

Supply Lines

UTILITY MEN TAKE DIM VIEW OF OIL QUOTA PROPOSALS

Oil-burning utilities are taking a jaundiced view of government efforts to stabilize supplies and prices of residual oil imports. Utility spokesmen in New England and Florida say the only solution is to raise oil import quotas above the present level of 415,000 bbls per day. This view is supported by the oil importers, who argue that the government's latest move may mean continued higher prices.

The government proposes increasing the number of companies authorized to import oil, but keeping the lid on the present quotas. Boston Edison Co, one of the largest oil buyers in New England, protested the move last week in a letter to the Interior Department, which administers the program. The Boston utility argued that the move to bring more suppliers in the market without raising oil import quotas would only make it more difficult for oil users to get oil at reasonable prices. One informed Florida utility man expressed the view that suppliers in his area might get less oil under the government proposal as most of the new importers would be in the Northeast.

The residual program started running into trouble this past summer. Spot shortages developed, and some long-standing customers—including some electric utilities—complained of inadequate deliveries. There were claims that the shortages were artificially induced and that normal supplies were being diverted by some importers in bids to lure new customers away from competing importers. The situation was marked by heavy price-discounting to some large buyers, while others claimed they were unable to get the fuel oil at even the usual price.

Prices are holding at around $2.40 per bbl in New England following the 15¢ rise put into effect in July. Protests over this price rise and the import program in general also lead the government to order a closer check on prices and deliveries.

There is another complicating factor in the outlook for residual import prices. Almost all of the residual fuel oil used by the utilities—mainly in the East—is imported, and most of the imports come from Venezuela and the Caribbean area. Venezuela and Arab oil countries presently are trying to get together to form a world oil proration and price stabilization system. If the countries succeed, one ambition would be to maintain the price of oil at a level desired by the producing countries, which could mean an eventual higher charge for residual fuel oil imported into US east coast ports. But oil industry trade experts question whether such a pact between the oil countries is workable.

One view held by the oil-using utilities is that the present import quotas exercised by the US will only hasten a cartel-type of arrangement on the part of the oil producing countries.

FOREIGN ELECTRICAL MANUFACTURER SIZES UP CURRENT US MARKET

The present price situation in the electrical equipment market is putting a crimp in the sales activities of foreign manufacturers. In an internal report circulated among its personnel by Brown Boveri Corp of Switzerland, the company says no clear-cut pattern can be discerned in the "chaotic price collapse" in US electrical markets. But, the report continues, "generally speaking . . . Brown Boveri and other foreign suppliers can no longer count on the nearly automatic price advantage they once enjoyed in the electric utility market and in some kinds of industrial equipment."

In the study, Brown Boveri concludes that the radical price cuts are coming out of profits rather than from large increases in manufacturing efficiencies or a recomputation of costs. It believes that in the wake of the antitrust indictments, the always-present, price-reducing factors, such as overcapacity, took over. As to its own role in the situation, Brown Boveri feels that "they (the large US manufacturers) didn't start the price war to strike at us and—all things being equal—would not for this reason alone continue it a single day if they could discover some way to end it."

The Swiss firm plans no broad-scale price cuts, but may make concessions, according to the report. It says, "While the present situation lasts we will not attempt to meet or better our competitors' 'give-away' prices across the board but instead will generally maintain our customary price levels. For strategic reasons—for example, to keep our competitors off balance or under unusual circumstances affecting a given customer or sale—we may occasionally make special price concessions."

PRICES REVISED DOWNWARD ON STANDARD DESIGN NETWORK TRANSFORMERS

New pricing procedure on network transformers that will offer savings up to 3% for units built to EEI-NEMA Standards, Class A, has been announced by General Electric Co's Distribution Transformer Department. Department Marketing Manager William R. Smart explained that prices on most network transformers have been lowered as a result of savings from the increased acceptance by electric utilities of standard design units. "In turn," he said, "this acceptance has enabled us to improve our productivity as a result of design simplification and mechanization of production methods."

Increases in a few network transformer prices reflect a declining usage by electric utilities of those designs involved, GE said. The price increases apply to ventilated, dry-type network transformers.

WHAT PURCHASING EXECUTIVES ARE SAYING

A slow but steady business increase throughout the Sixties was forecast by Chester F. Ogden, vice president of Detroit Edison Co, speaking before a purchasing group. Ogden, who has been chairman of the business survey committee of the National Assn of Purchasing Agents since 1955, cautioned his audience not to look for any sharp upswing in the balance of 1960 or the first quarter of 1961. During that period, he said, business is likely to continue on the current plateau. He predicted that prices would remain steady. He also forecast that 1961 will probably be better than 1960 with a steady increase and a definite gradual improvement. "It's early in the Sixties," he continued. "We still have plenty of time for a boom."

From a purchasing executive in a Middle Atlantic utility comes the suggestion that long range planning by the different interconnection purchasing people might do a lot to decrease the problems connected with cyclical ordering of large steam-electric generating units.

From another Middle Atlantic utility purchasing executive comes the comment, "We're happy about the present prices, but we would increase our purchases only in anticipation of an early end of the present market."

Here's what they're saying about...

"The Second 50 Million"...

the O-B film on suspension insulators—has been seen by more than 3500 electric utility personnel to date (management, purchasing, engineering, operating).

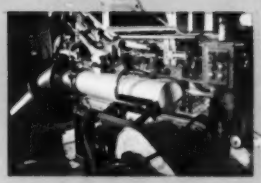
Here's what they're saying about it:

"This is the best manufacturing film we've seen. We'll schedule more showings here as time permits."

"First film of its type ever shown here. Not only informative but educational."

"Best industrial film I have ever seen."

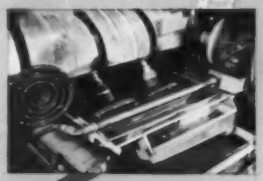
"Film definitely worth the time and trouble to show it."



"Saw the film twice . . . now want to show it to District Engineers."

"Excellent. Brings the factory right to our office."

"Certainly gives a greater appreciation of technical design, production, and testing that goes into O-B insulators."



"Would like to show this at our company school."

"Really a superior job . . . have revised thinking on who should see it."

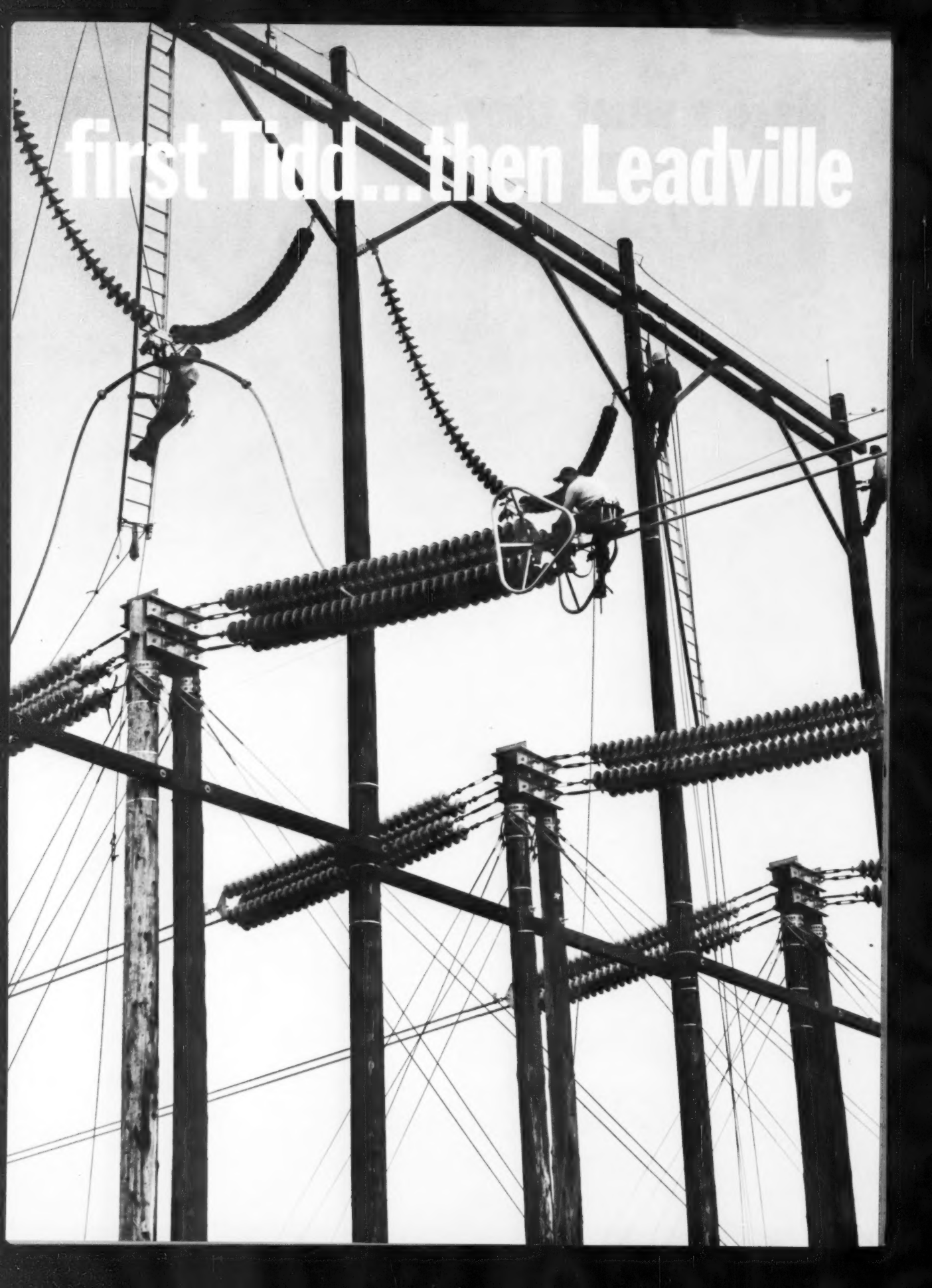
"Want to show it at other company offices."

"Much more interesting than most we see."

For a showing in your office, at your convenience, contact your local O-B representative.

Ohio Brass OB HOLAN

PORCELAIN INSULATORS · LINE HARDWARE · CAPACITORS · LIGHTNING ARRESTERS BUSHINGS · HOLAN TRUCK-MOUNTED POWER DEVICES AND BODIES · BRONZE VALVES


first Tidd...then Leadville

...now Penelec

when EHV history is being made... O-B is there!

Pennsylvania Electric Company's 460-kv experimental transmission line, energized on September 30, is the first in the country to carry power at this voltage as part of an established grid.

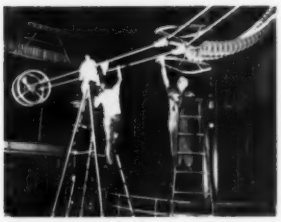
O-B supplied Futura suspension insulators, suspension hardware, shielding rings, and spacers for the twin-bundled conductors, plus 460-kv and smaller bushings.

No less important were the O-B engineering, research, design, and test capabilities that helped to transform the initial concept of the line into present reality.

For the electric utility industry, for Pennsylvania Electric Company, and for Ohio Brass and other participating manufacturers, September 30 marks another milestone in transmission history.

We at Ohio Brass are proud to have had a part in it.

OHIO BRASS COMPANY, MANSFIELD, OHIO



O-B insulator assembly for Penelec "running angle" is prepared for test in the O-B high-voltage laboratory.

Twenty-foot-long, three-ton O-B bushing is installed in Penelec 460-kv single-phase transformer.

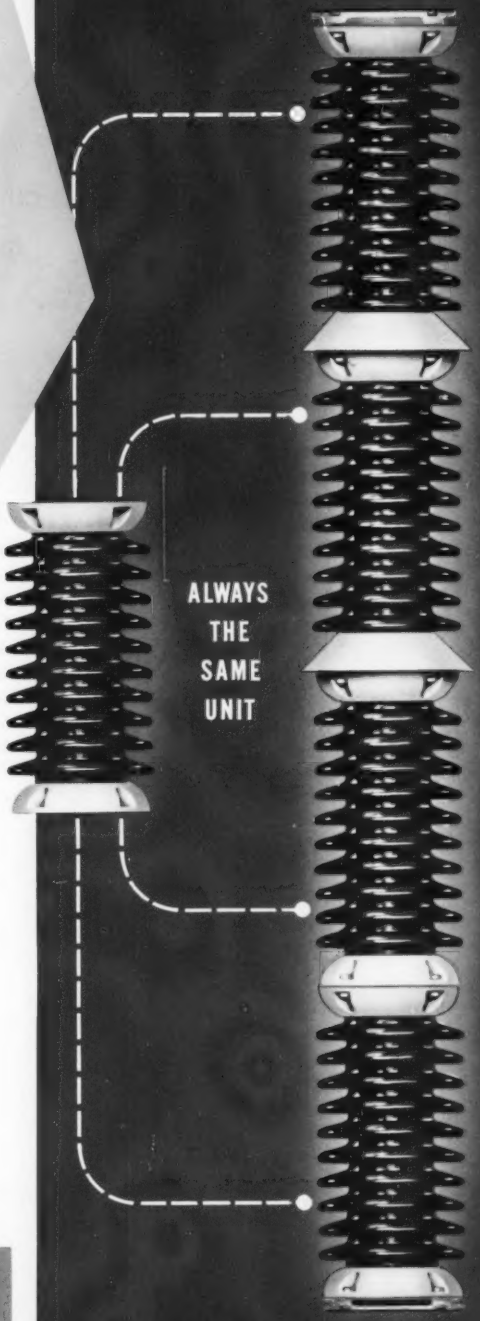
Ohio Brass

HOLAN

PORCELAIN INSULATORS · LINE HARDWARE · CAPACITORS · LIGHTNING ARRESTERS
BUSHINGS · HOLAN TRUCK-MOUNTED POWER DEVICES AND BODIES · BRONZE VALVES

Stacking post improved

New fully interchangeable O-B Unipost increases stability of stack . . . drastically reduces inventory



Until the introduction of the new O-B Unipost, if you sought the advantages of a stacking station post it necessitated warehousing three separate specialized units: one for top position, one for bottom position, and one for mid-stack locations. Because of small bolt circles and mounting bases that made these units non-interchangeable, you also sacrificed stability in the stack.

As the Unipost name implies, one unit now fits every stack location. Large bases and bolt circles exist throughout. The Unipost has a broad foundation that gives you strength *plus rigidity*.

If you wish to adapt the Unipost to earlier practice or to existing smaller dimensions of associated elements, the Uniplate provides complete facilities for this.

Inventory cost is cut as much as two-thirds - - confusion at the stock room or on the construction site is eliminated - - mechanical factors of stacking posts are definitely improved - - when you insulate your stations with the modern O-B Unipost.

OHIO BRASS COMPANY, MANSFIELD, OHIO
Canadian Ohio Brass Co., Ltd., Niagara Falls, Ont.

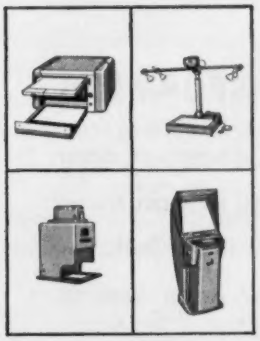
Ohio Brass HOLAN

PORCELAIN INSULATORS · LINE HARDWARE · CAPACITORS · LIGHTNING ARRESTERS
BUSHINGS · HOLAN TRUCK-MOUNTED POWER DEVICES AND BODIES · BRONZE VALVES

10031-H4

Utility record problems too BIG to handle?

Remington Rand Microfilm cameras and equipment give fast, efficient solution to record storage, protection and copying!



Prove to yourself how Remington Rand microfilming can solve space, storage and copying problems as well as help you devise new office techniques and systems. Even more important, Remington Rand microfilm experts are always available to you to *diagnose* record problems—help you train personnel in modern microfilm techniques. Learn all the advantages of Remington Rand Cameras—the best of the portables and stationaries—and all the supplementary equipment and services that go with them . . . see what they can do for your particular business operation. Get all the information on the complete microfilm line—Remington Rand! Use the attached coupon now—no obligation, of course.

Remington Rand Systems
122 East 42nd Street
New York 17, N. Y.

I wish more information on Remington Rand Microfilm Equipment and its application to my business.

Name_____

Title_____

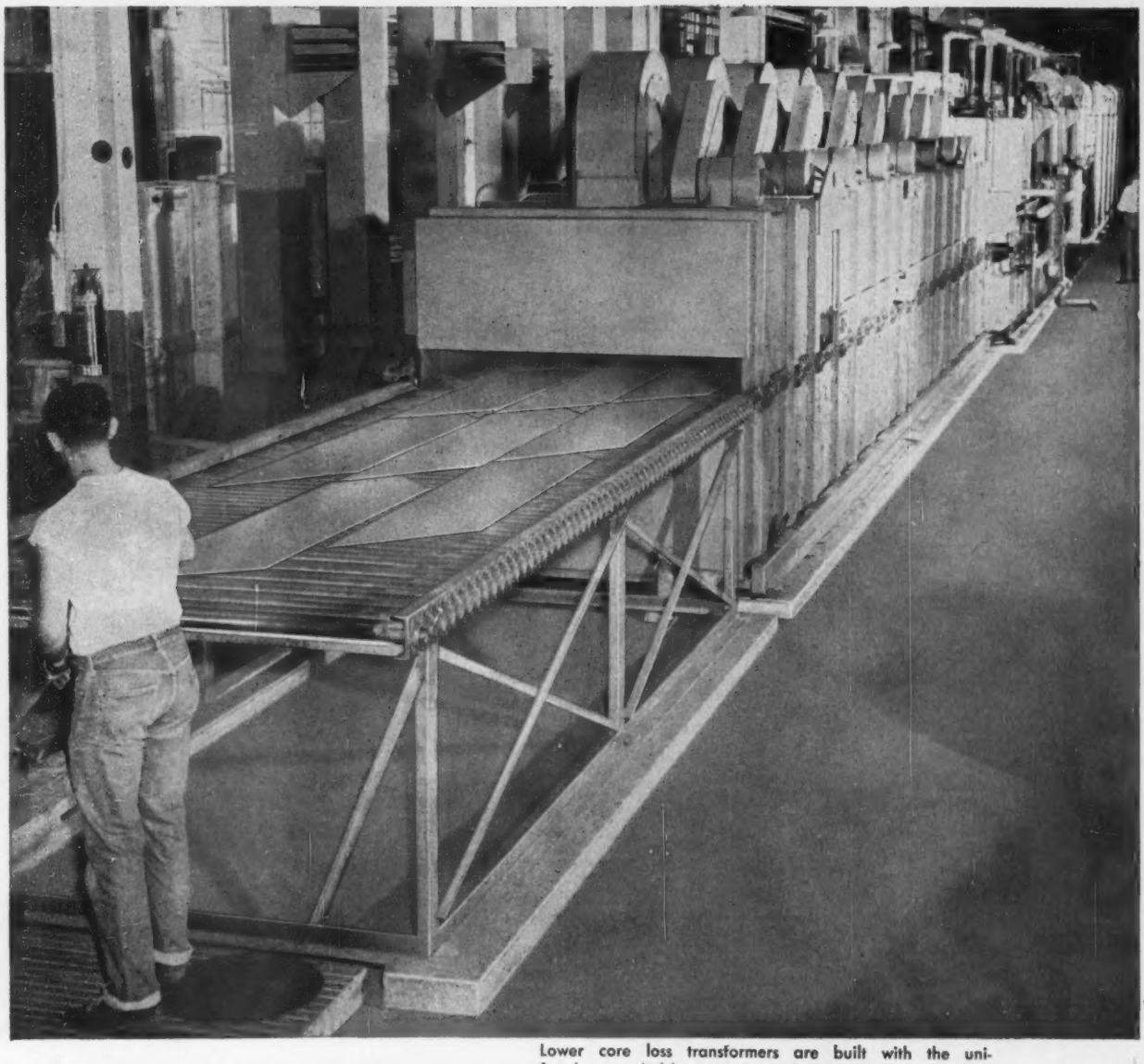
Company_____

Address_____

City_____ Zone____ State____

110-EW

Remington Rand Systems DIVISION OF SPERRY RAND CORPORATION
122 East 42 Street, New York 17, N. Y.



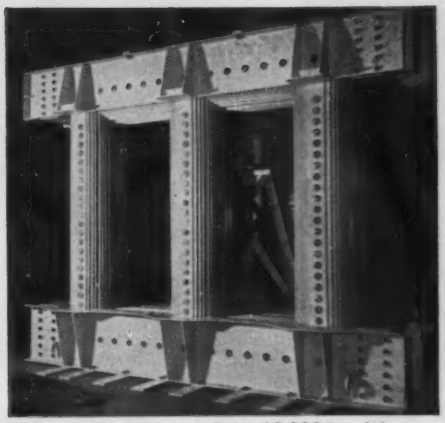
Lower core loss transformers are built with the uniformly annealed laminations produced by this new furnace.

In Wagner's Transformer Plant...

A NEW ANNEALING FURNACE PRODUCES BETTER CORES FOR POWER TRANSFORMERS

Now, in every Wagner® Power Transformer, there's a new, compact core structure: mitered cores made of cold-rolled, grain oriented silicon steel that greatly reduce the across-the-grain component. Rolling follows the direction of the flux path,... results in extremely low core losses and low exciting current.

Highly skilled Wagner transformer technicians carefully assemble core laminations after they come from the continuous annealing furnace.



Split-type 3 phase core for a 60,000 kva Wagner Power Transformer.

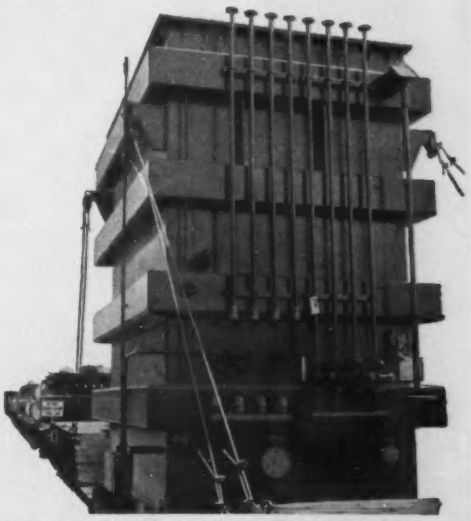
Continuous annealing of laminations enables us to make the most of these improvements in core steel and core design. Each individual lamination moves through automatically controlled heating and cooling chambers in our modern, continuous roller hearth furnace before being assembled into transformer cores that conform to the industry's highest standards.

This uniform annealing process relieves stresses so evenly that edge and ripple factor is extremely small. The annealed laminations are perfectly flat . . . practically free from stresses that affect magnetostriction and permeability. This flatter steel makes it possible to build tighter, more compact, virtually vibration-free core structures; minimum sound levels are achieved. And, the mitered core design substantially reduces across-the-grain losses and ampere-turn exciting current for peak electrical performance.

This new furnace, put into service a year ago, effectively cuts annealing time from days to minutes . . . produces highest quality, ready-to-use core materials at a rate that greatly reduces the time needed to manufacture finished transformers.

The performance stability of Wagner® Power Transformers is outstanding. But, this stability is just one part of the story . . . quality is designed and built into every part of each transformer by specialists with years of engineering and production experience. Why not consult us about your power transformer requirements? Your nearby Wagner Sales Engineer is at your service. Call him . . . or write us.

Mitered core construction greatly decreases across-the-grain component. Rolling follows direction of flux path.



Another quality Wagner Power Transformer begins its journey to the installation site.

WT60-13

Wagner Electric Corporation

6456 PLYMOUTH AVE., ST. LOUIS 33, MO.

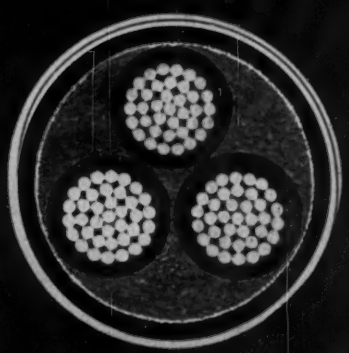
BRANCHES AND DISTRIBUTORS IN ALL PRINCIPAL CITIES

SPACE SAVING
EASILY TRAINED
LIGHTWEIGHT LONG
RUNS LOW INSTALLED
COST FLEXIBILITY FOR
FUTURE CHANGE AND
EXPANSION

GENERAL CABLE

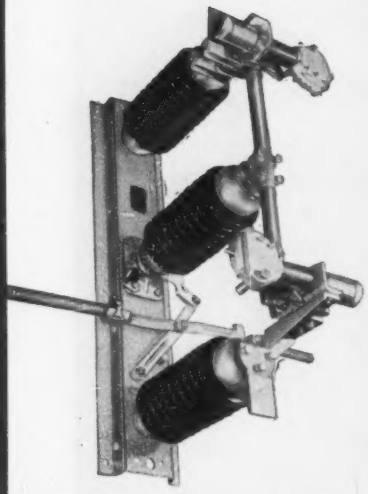
INTERLOCKED ARMORED CABLE

For full protection under all conditions install General Cable Interlocked Armor...the cable for power, control, communication and lighting systems. This compact, versatile cable is available in a wide range of constructions, insulations, armors and voltage ratings. Colored polyvinyl chloride jacket over the armor can be furnished where required. "How to Obtain the Greatest Advantage Per $ Spent" a comprehensive folder detailing General Cable's complete line of Interlocked Armored Cables is available upon request. **General Cable Corporation**, 730 Third Avenue, New York 17, New York. Offices and Distributing Centers Coast-to-Coast.

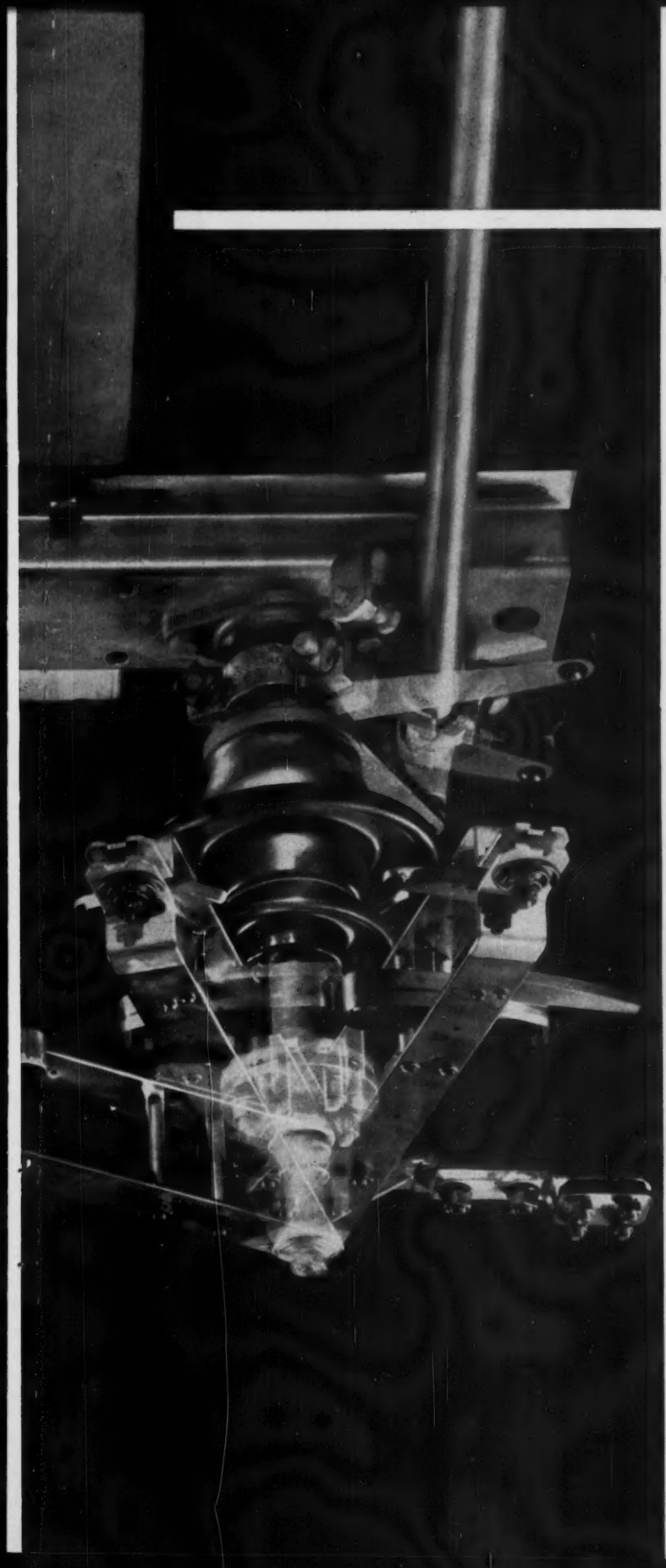


SPLIT THE LOAD

(OR EVEN DUMP IT)



Double-Break Style, 34.5 kv rating (above) and Side-Break Style, 14.4 kv rating (right)



with S&C Load Interrupters that cost no more than disconnects

Now from S&C you can get load interrupters at the same price as disconnects. This means that you can handle any kind of line switching in the simplest way at the lowest possible cost.

Here are the devices that do it:

1. The Side-Break Alduti Load Interrupter at 7.2 kv and 14.4 kv, and
2. The Double-Break Alduti Load Interrupter at 23 kv and 34.5 kv.

Both give you load dumping* (full 600-ampere arc-free load switching at full line voltage) along with loop sectionalizing (switching currents in parallel or loop circuits) and line dropping (switching line charging currents).

Since these switching duties at today's voltages and loads can't be handled by disconnects, why not compare the cost of S&C Load Interrupters with disconnects. You'll find there's no premium price for premium performance.

Here are some of the other advantages of S&C Load Interrupters:

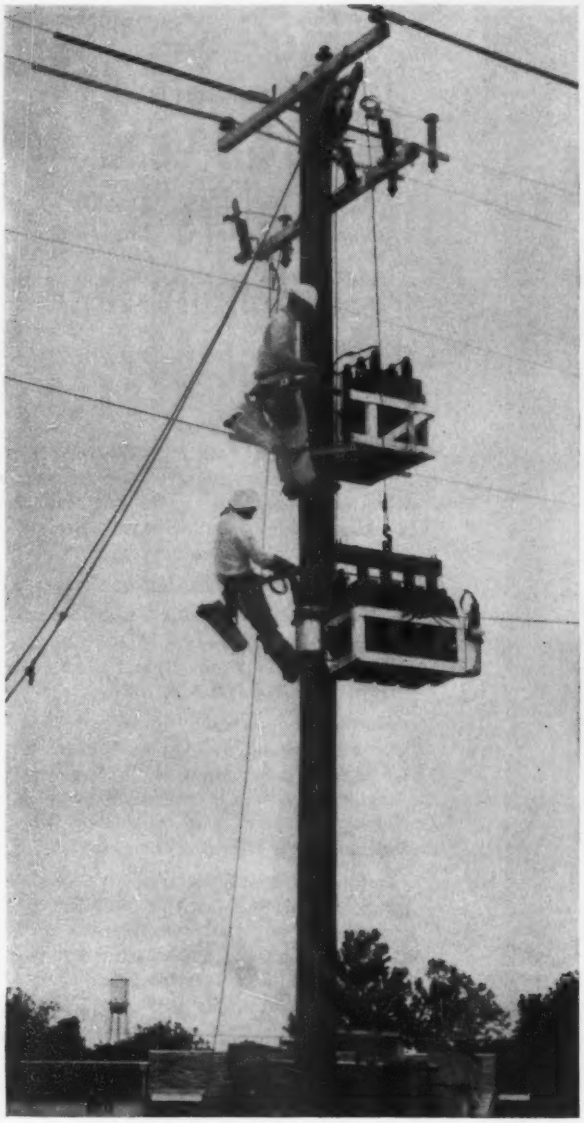
- 600-amp load switching without line or feeder breaker openings
- a maintenance-free interrupting device
- no external arc
- can be mounted in any position . . . vertical, upright or inverted.

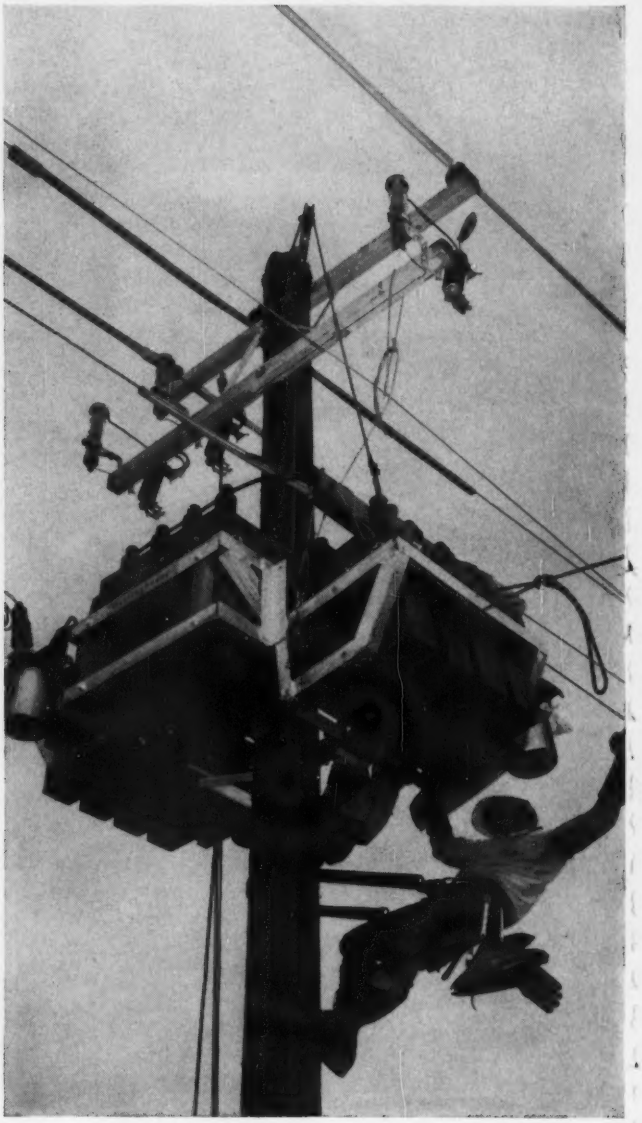
For more information, please contact S&C Electric Company, 4421 Ravenswood Avenue, Chicago 40, Ill.

* Important because: (1) Emergency situations (wires down, etc.) demand quick action, hence dumping the load. There is no time to set up communications for complicated breaker and switch sequencing. And (2) there's always the possibility of an operator error or misunderstanding, with the result that a loaded circuit may be dumped inadvertently.

S&C ELECTRIC COMPANY

S&C



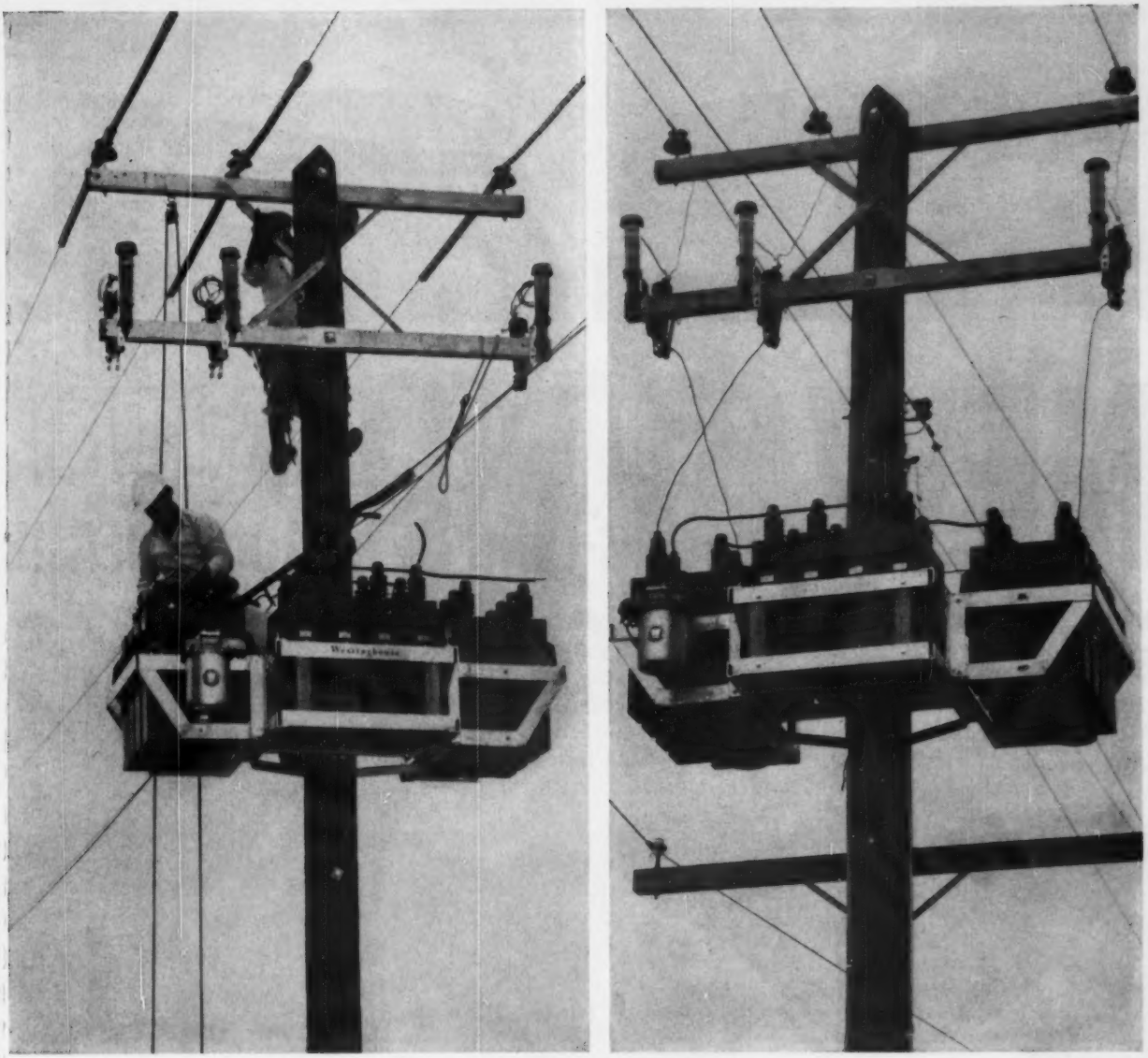


100-kvar Capacitor in 1200-kvar Autotrol

Doubles Pole-Top Capacity—Saves Space,

Lighter and more compact than previous units, the Westinghouse 100-kvar capacitor brings you new economies in complete Autotrols and stack-type equipments. You reap greater efficiencies in doubled capacities, save real dollars in pole space, installation and equipment costs.

For example, a 1200-kvar Autotrol® of these units now occupies no more pole space than a 600-kvar Autotrol of 50-kvar units. Autotrols come completely assembled and wired, ready for fast, easy installation. They are available in cluster and in-line arrangements. 100-kvar capacitors are also available in stack-type equipments for substation use.



Photos show 1200-kvar cluster-type Autotrol being installed by a Texas utility. This Autotrol consists of twelve 100-kvar Westinghouse capacitors with CSL oil switches.

Installation and Equipment Dollars

Check these Westinghouse cost-saving features:

- Fewer units with smaller dimensions mean pole space saved.
- Simple wiring and mounting in racks make field installation of banks easy.
- For stack-type installations, more compact design and greater capacity reduce number of units needed, reduce wiring, connections and fuse requirements.

Let us show you how these savings can apply to your system. Call your Westinghouse representative, or write Westinghouse Electric Corporation, P.O. Box 868, Pittsburgh 30, Pa.

You can be sure . . . if it's Westinghouse. J-61009

Westinghouse

CORVAN

LOADSIDE PICKUP

NEW FROM CHEVROLET

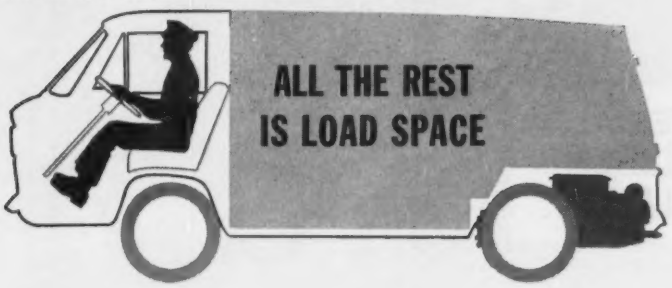
★★★★★★★★★★★★★★★★★★★★★★★★★★★

!!! WING-DING OF A TRUCK IDEA !!!

Here's a totally new kind of truck that gives you more load space than a conventional half-tonner, plus the inherent economy of an air-cooled engine! A truck that will carry up to 1,900 lbs. of payload (with a trim 4,600-lb. G.V.W.) on a nimble 95-inch wheelbase. A truck that measures only 15 feet long and devotes nearly 9 feet of it to payload! Dollar-saving performance starts with the engine—a space-saving "pancake" 6 that never needs anti-freeze or radiator repairs . . . and never stops saving fuel costs! Ideally suited for trouble-free truck duty, also, is the *tough* chassis build of Corvair 95, which includes frame and body designed as a rugged one-piece unit to

RAMPSIDE PICKUP

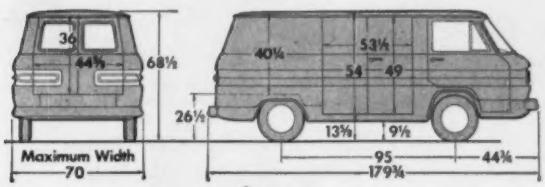
DRIVER'S UP FRONT . . . ENGINE'S IN THE REAR



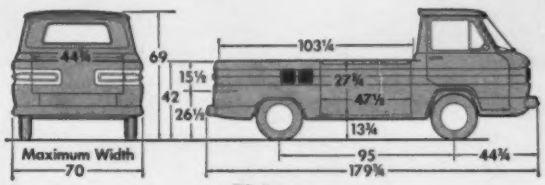
CORVAIR 95 ★★★★★ TRUCKS

withstand slam-bang runs. And there's *4-wheel independent suspension* (first time in a U.S. truck!) to take the roughness out of road surfaces. The list of Corvair 95 design advantages is as long as your arm. There's load space so accessible that the truck practically loads and unloads itself! There's exceptional driver comfort, easy maneuvering, snappy styling, and much, much more. It's a wing-ding of a truck idea—available in pickup and panel body versions. Visit your nearby Chevrolet dealer soon and get all the details. . . . Chevrolet Division of General Motors, Detroit 2, Michigan.

★★★



Corvan



Pickups

New Corvan. There's a world of load space in this new Chevy panel—it's 109″ long, 60″ wide and 54″ high at center! Side doors take a 4′ x 4′ crate with ease. Left side doors are optional at extra cost.

New Rampside pickup. Roll out those heavy loads—there's nothing to it in this one! Ruggedly built side gate drops down to form convenient ramp for *easy* loading or unloading.

New Loadside pickup. Gives you more load space than a conventional half-tonner. Also, optional extra cost *flat floor* provides 39 sq. ft. of loading area, and you can stow cargo underneath it, too.

Less truck weight allows more cargo weight! Corvair 95's weigh up to 1,200 lbs. less than other half-tonners . . . yet they'll carry up to 1,900 lbs. of cargo!

50-50 weight distribution! Husky 2,500-lb.-capacity front and rear suspensions carry nearly equal loads to reduce strain on chassis and tires.

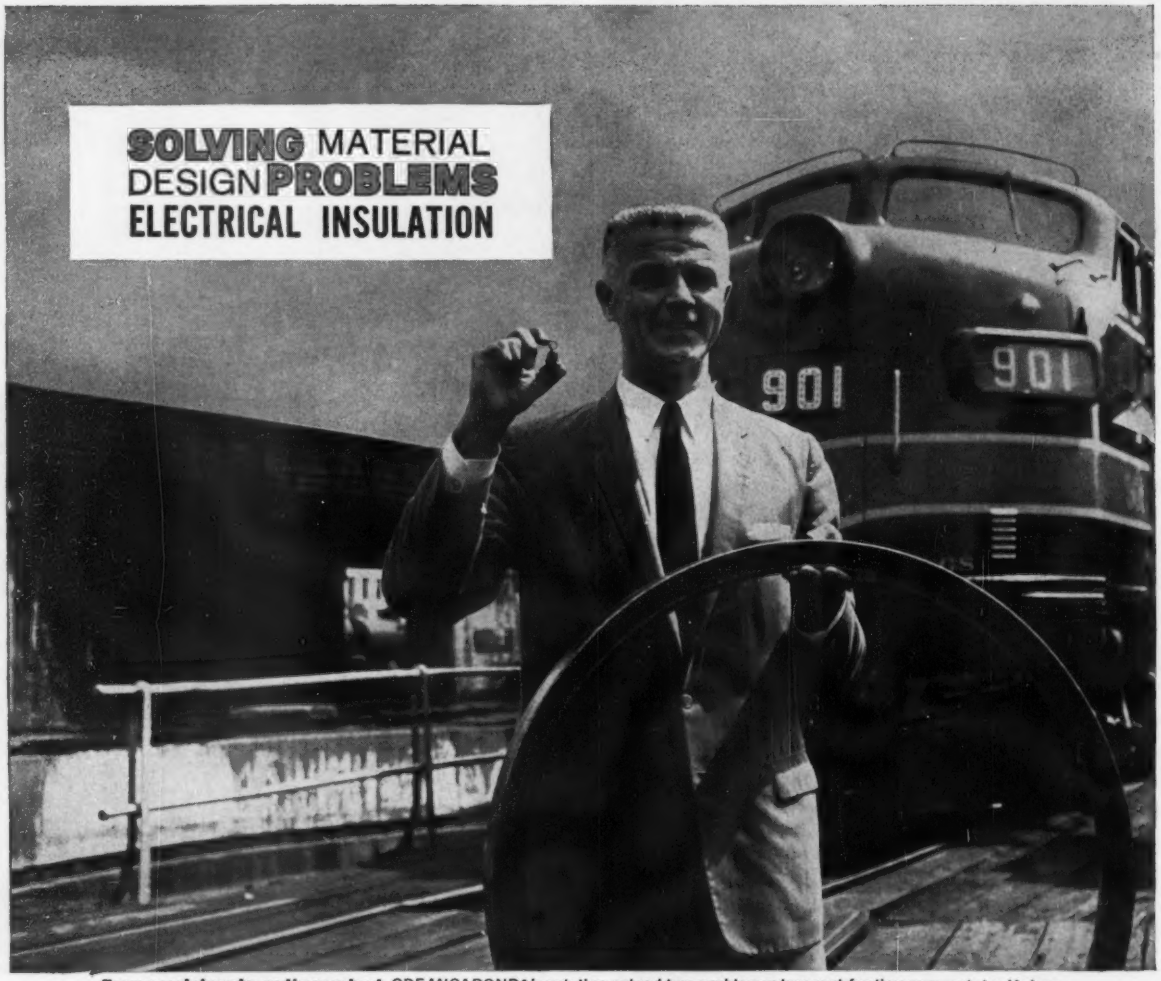
More load space, less road space! Corvair 95's are 2 feet shorter than conventional half-tonners. But Corvair 95's carry bulkier cargoes!

Easiest to get around in! Turning radius (under 20 feet) is less than that of ordinary trucks. That means easier maneuvering and parking.

1961 CHEVROLET STURDI-BILT TRUCKS

CHEVROLET

SOLVING MATERIAL DESIGN PROBLEMS ELECTRICAL INSULATION



From a cool shave to continuous heat. CDF MICABOND® insulation solved two problems: low cost for tiny commutator V-rings in electric shavers . . . continuous heat in traction motor and generator V-rings and segments for diesel locomotives.

You get the exact physical and electrical properties you want at low cost when you have a wide selection of grades to choose from, plus engineering know-how to help you with your selection.

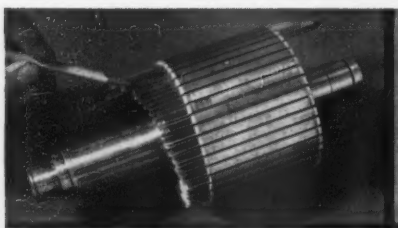
The many grades and types of MICABOND made it comparatively easy to solve the different insulation problems posed by low cost shaver motors and rugged locomotive traction motors and generators.

In addition to the MICABOND line, CDF makes the industry's widest range of laminated plastics, vulcanized fibre, and other electrical insulating materials. For MICABOND information, write us for catalog M-59. For other product information, ask for General Folder 60. Or check your Sweet's Product Design file.

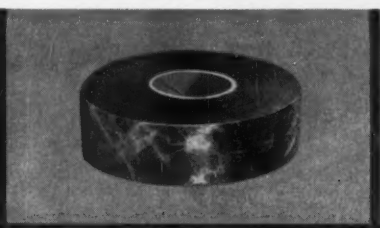
CONTINENTAL-DIAMOND FIBRE

A SUBSIDIARY OF THE Budd COMPANY • NEWARK 15, DEL.

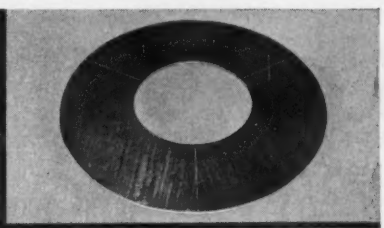
In Canada, 46 Hollinger Road, Toronto 16, Ont.



Long-life insulation. CDF MICABOND is used in low-cost slot-cell insulators in motor assemblies.



Flexible. CDF MICABOND tapes provide high heat resistance for many types of electrical windings.



Impact resistance. A reason why MICABOND was used as disc insulators for giant magnetic cranes.

NEW
NEW

Announcing . . .
the new, improved . . .

MOLONEY

Distribution
Transformers

MOLONEY ELECTRIC

Now the best is Better for '61

COMPARE
COMPARE
COMPARE

So that you may decide for yourself . . . examine the design of new improvements . . . review the features which were retained . . . compare *all* of the advantages of Moloney Transformers with competitive units. You will agree that these new improvements—combined with features that have been retained . . . add up to the best total value for your transformer dollar.

NOW THE NEW MOLONEY DISTRIBUTION TRANSFORMERS

Presently Available In Conventional And CSP Types Through 100 KVA

NEW DESIGN FEATURES

1. A deep-drawn, crowned cover—has smooth rounded surfaces which readily shed moisture and are devoid of places where corrosive material accumulates. Of great importance on transformers having cover mounted bushings, is the increased distance from the crown of the cover to the mounting band. This, when combined with Duracoat Insulation, provides maximum protection against outages due to birds, etc.

2. Internal cover grounding and positioning method—for Duracoat insulated covers. A captive phosphor-bronze spring positions and automatically grounds the insulated cover to the tank, to prevent radio frequency interference and eliminate shock hazards to linemen.

3. Cover clamping band—provides uniform pressure around the entire circumference of the cover. Clamping is done by a stainless steel bolt whose swinging hinge action permits ready removal of the cover. There is no chance of dropping parts of the clamp, since all parts are captive.

4. Numerous weep openings—are formed in the clamping band to prevent water being trapped in the band.

5. Handhole cover having a single center bolt closure—facilitates entry into the tank—exerts uniform pressure on the corprene sealing gasket. The clamping bolt has a large square head requiring less force to turn the bolt and has rounded corners to protect its plastic coated surface from damage during installation or removal of the handhole cover. Pressure is exerted on the gasket by means of an internal bar captive on the bolt and held in place by a welded stop. When the handhole cover is removed all parts remain attached, thus preventing them from being dropped. The transformer is sealed at the closure-bolt opening by a nylon sealing gasket which is protected by the flanged underside of the bolt head.

6. New lifting hooks—have a smoothly contoured lower surface to prevent sling abrasion. This hook is designed to permit use of cable or rope slings even on the smallest of transformers without damage to bushings.

7. Stronger tank top rim—obtained by rolling approximately 400° to give greater resistance to distortion when coverless transformers are lifted without a spreader and with short slings. This new rim retains our previously proved cover gasketing system in which the cover gasket fits on the top of the rim, not on the side, where it could trap oil along the top edge of the tank.

8. The three-point suspended core-and-coil assembly—prevents pressure contact of core-and-coil with the tank bottom and thus achieves a reduction in sound level. The top two points of the suspension system each consist of two conically matched surfaces, one on the framing—the other on the tankwall, on each side of the transformer. These conical surfaces are bolted together, they prevent shear on the bolt while still supporting the weight of the transformer.

9. High strength frame design—maintains eight-point blocking of coils and increases short circuit withstand.

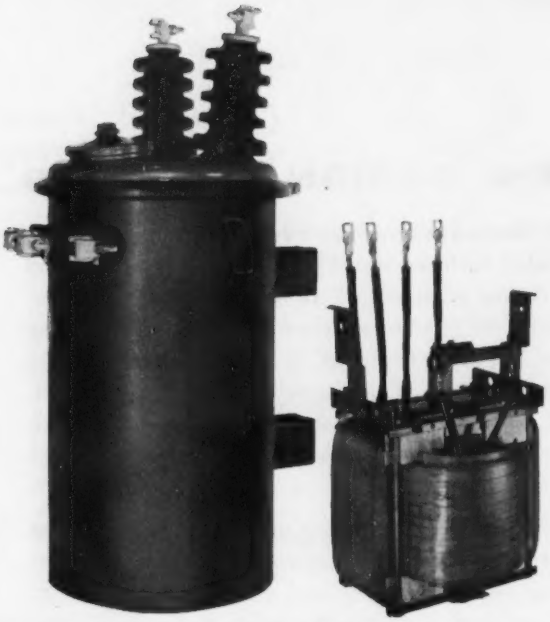
10. Steel shipping band—connected to the lifting hook to secure the transformer on the shipping pallet and thus facilitate handling of the palletized transformer by fork lift trucks.

11. Wire bound, wooden slat protective enclosure—nailed to the pallet. This enclosure has been exhaustively pre-tested and has great strength to permit stacking. One of the advantages of this enclosure is that it may be easily stripped away, leaving only the palletized transformer. This will reduce the time required to install the transformer, and also reduce the amount of scrap material at the job site.

MOLONEY ELECTRIC COMPANY • SAINT LOUIS 20, MISSOURI

THE NEW MOLONEY DISTRIBUTION TRANSFORMERS

Presently Available In Conventional And CSP Types Through 100 KVA



PLUS THESE RETAINED DESIGN FEATURES:

The Moloney Core, with its inherently low exciting current —low core loss — low sound level. • Low impedance design, resulting in improved voltage regulation. • High short-circuit strength so necessary in the low-impedance design, results from the use of resin-coated paper in the consecutively wound coils, and the eight-point blocking system. • Extra insulation at all line ends and other vulnerable points in the coil. • Duratherm insulation, a high-temperature insulation which permits operation at increased KVA, or increases transformer life expectancy. • Liberal use of cooling ducts, resulting in a low temperature gradient, high overload capability. • Vinyl tubing around all leads where they pass through the coil. • Inhibited oil. • High impact strength — liberal creepage bushings resist damage. • Internal clamping of all bushings, to prevent corrosion at these points. • Special-design bushing opening and mounting hardware, to prevent radio frequency interference. • Connectors — electro-tin coated, and large enough to accommodate the ACSR equivalent of copper conductors specified by EEI-NEMA Standards. • Triple-thick tank bottom rim, for added protection. • Duracoat insulated covers to provide protection against outages. • Retained gaskets at all openings, to minimize the possibility of moisture or air entering the tank. • Patented, automatic, electronic testing, your certified assurance of high quality and superior performance in every distribution transformer that is shipped. • Moloney's combination of balanced design features results in the highest value for your transformer dollar . . .

COMPARE THESE FEATURES . . . Plastic Coated, Deep-drawn Cover • Internal Cover Grounding • Cover Clamping Band • Water Shedding Weep Openings • Center Bolted Handhole Cover • New Lifting Hooks • Hercules Tank Rim • Three-point Suspension Of Core-and-Coil Unit • High Strength Frame • Steel Banded Palletized Unit • Removable Protective Shipping And Stacking Enclosure • Low-loss, Low-exciting current Moloney Core • Low Impedance • High Short-circuit Strength • Extra Insulation • Duratherm Insulation • Low Temperature-gradient • High Overload Capacity • Vinyl Tubing On Leads • Inhibited Oil • High Impact Strength • Internally Clamped Bushings • Radio-frequency-interference-free Bushings and Hardware • ACSR—CU Connectors • Triple-thick Tank Bottom Rim • Retained Gaskets • Patented, Automatic, Electronic Unit Testing.

Only Moloney offers all these plus features in distribution transformers

Compare . . . Then Specify Moloney Distribution Transformers

MOLONEY ELECTRIC COMPANY

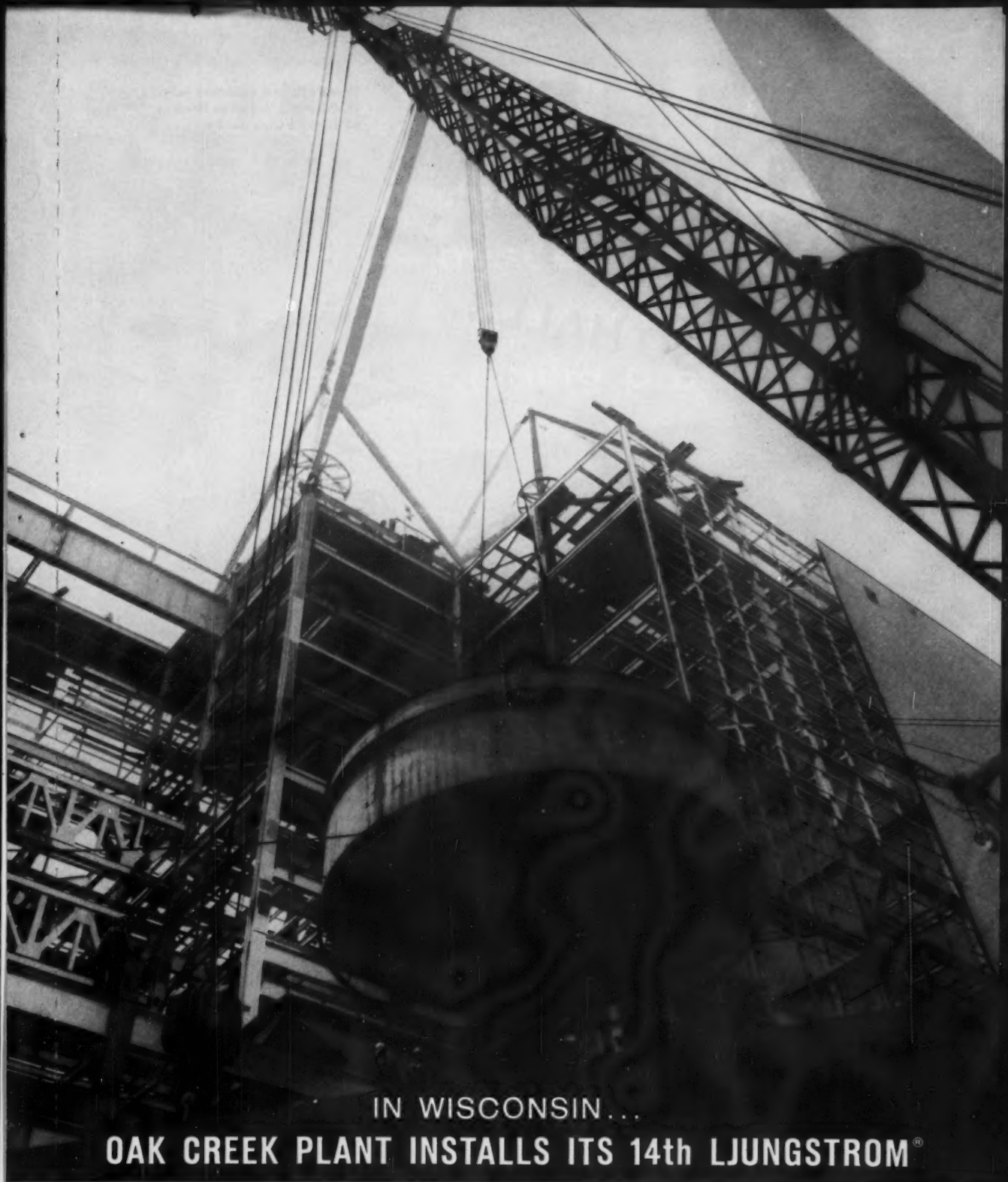
Manufacturers of Transformers for Utilities, Industry, and Electronic Applications

MOLONEY ELECTRIC

FACTORIES AT ST. LOUIS 20, MO., AND TORONTO, ONT., CANADA

SALES OFFICES IN ALL PRINCIPAL CITIES

ME60-27



IN WISCONSIN...

OAK CREEK PLANT INSTALLS ITS 14th LJUNGSTROM®

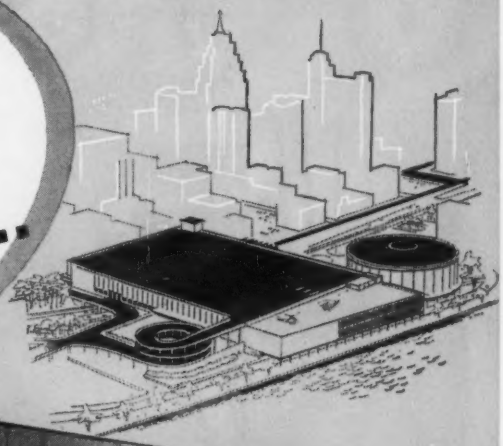
Three new Ljungstrom Air Preheaters are being added to the eleven already in service at Wisconsin Electric Power Company's Oak Creek plant. These three 290-ton units will serve the 1,780,000 lb/hr boiler on Oak Creek's #6 unit. The three Ljungstroms, with a total heating surface of 795,300 sq ft, will reduce stack gas temperature from 550°F to about 270°F and preheat incoming combustion air from 190°F to about 510°F.

Our engineers will be glad to recommend how Air Preheater equipment can improve your operating results on new or existing fuel fired units.

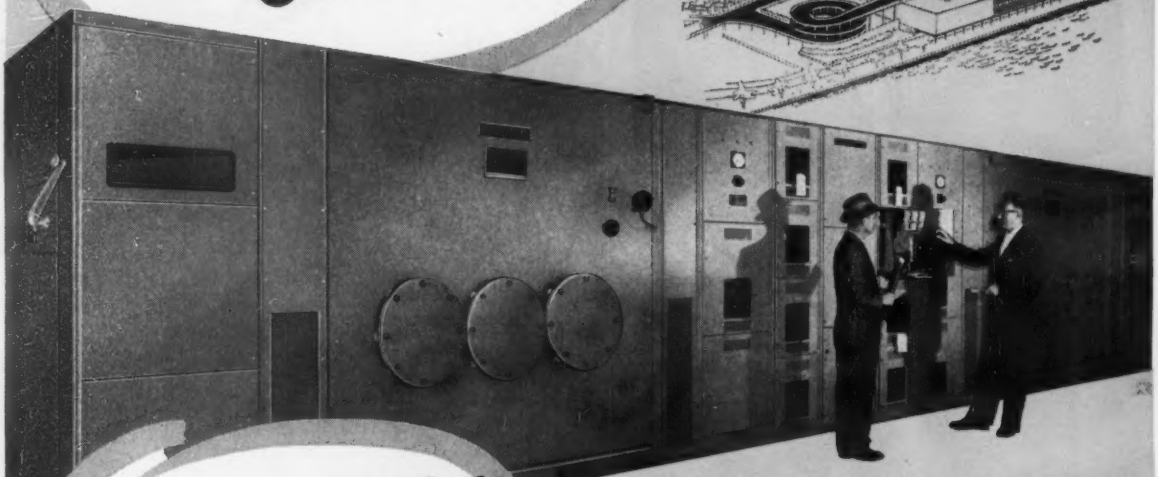
THE AIR PREHEATER CORPORATION

60 East 42nd Street, New York 17, N. Y.

11 SQUARE D SUBSTATIONS SERVE COBO HALL...



World's largest exhibition building, COBO HALL occupies 10 acres of Detroit's Civic Center



...capable of supplying 22,000 KVA of continuous power!

Square D Field Engineer Don Selby *(right)* and Mr. Gil Brandt, Project Electrical Engineer of Giffels and Rossetti, architect for COBO HALL, examining one of the drawout circuit breakers in the low voltage secondary portion of a Square D 2000 KVA double-ended unit substation equipped with nitrogen-filled transformers

Easy, fast installation was a prime objective when eleven Square D unit substations went into COBO HALL. The various sections of each substation were completely coordinated at the factory. Reconnection of those sections at the job site required a minimum of time and labor.

Design leadership is very much in evidence in Square D's broad line of unit substations. We suggest a three-point comparison to prove the point—ease of installation, minimum maintenance, maximum safety for both equipment and personnel.

AMONG OTHER SQUARE D EQUIPMENT IN COBO HALL

31 Control Centers
28 Switchboards
450 Panelboards
75 Contactor Panels
1 Dimmer Board
10 Dimmer Panels
16 NEMA 4-Circuit Interrupters
120 Spotlight Control Panels
19,000 feet of Lay-In Duct

SQUARE D COMPANY

wherever electricity is distributed and controlled

CADWELD®

offers the world's finest electrical connections for lightning protection . . .

TA CONNECTION LIGHTNING CABLE RUN AND TAP.

TA CONNECTION LIGHTNING CABLE RUN—LIGHTNING ROD TAP.

GY CONNECTION OF LIGHTNING CABLE TO LIGHTNING ROD.

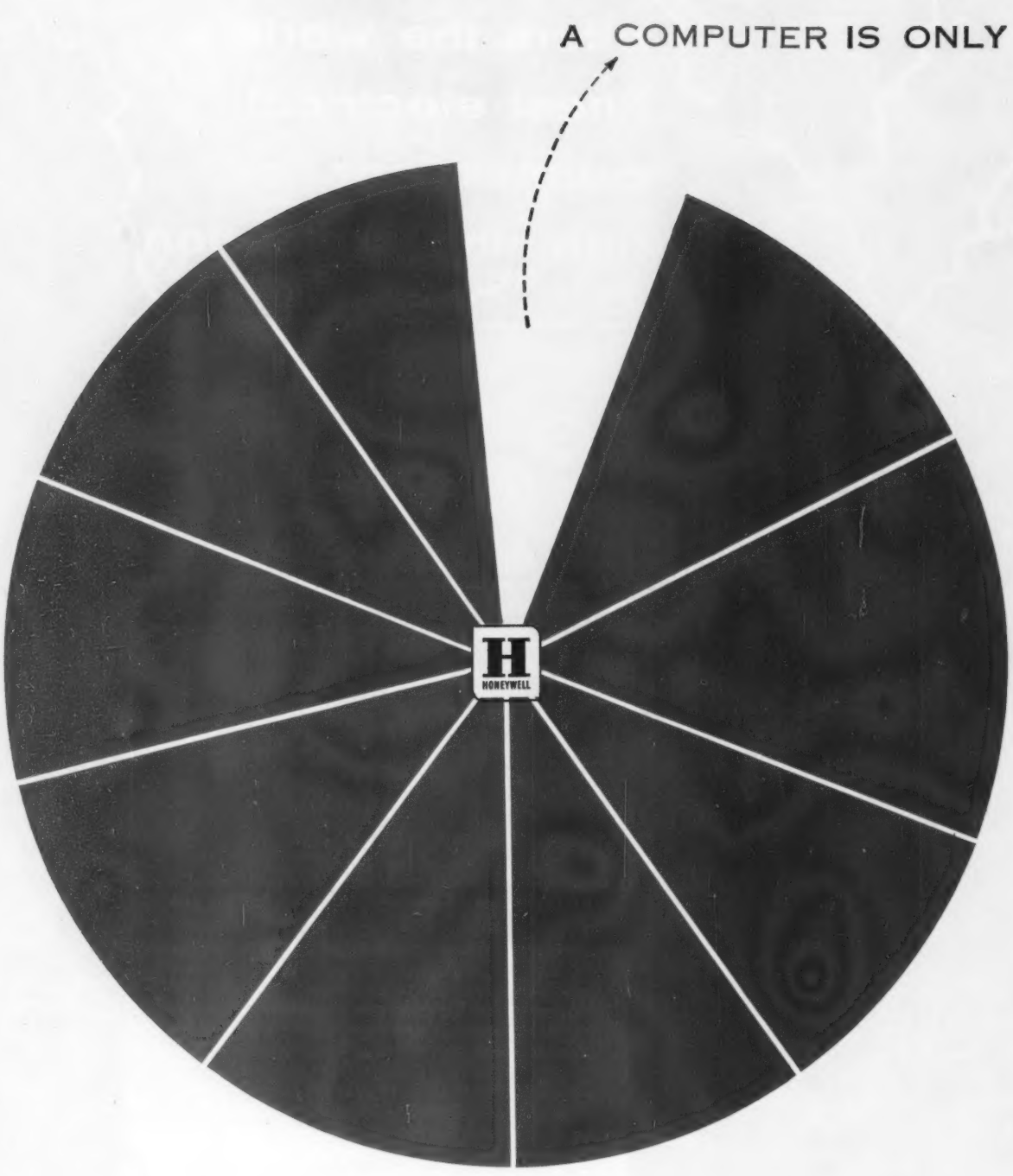
CADWELD Copper Electrical Connections, because of their ability to withstand: corrosive conditions, weathering and extreme current surges, are ideal in your lightning protection system. A CADWELD Connection can carry more current than the conductor itself.

CADWELD Connections—cable to cable—cable to lightning rod and points—cable to ground rod—cable to steel structures are available for all lightning cable sizes and types.

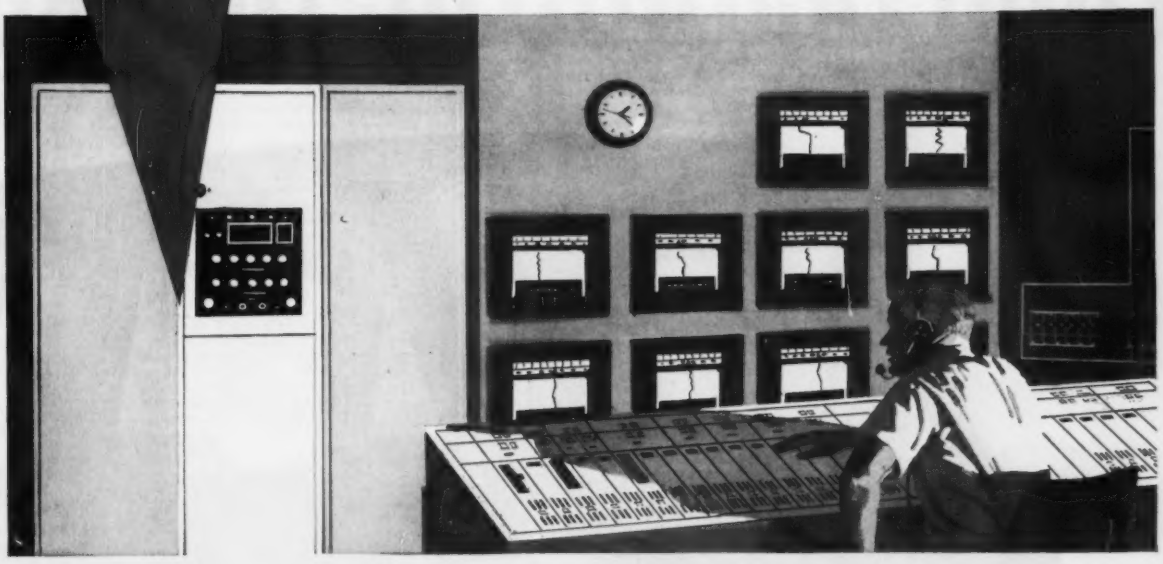
For more information contact your local CADWELD distributor or write direct to:

For the best in electrical connections—specify CADWELD

CADWELD
Electrical Connections®
ERICO PRODUCTS, INC.
2070 E. 61st Place, Cleveland 3, Ohio
Distributed in CANADA by
CLM Industries—Toronto 13, Canada
cable address—ERICOPROD—CLEVELAND


A COMPUTER IS ONLY
H
HONEYWELL

PART OF ECONOMIC DISPATCH CONTROL



You hear a lot about computer-controlled load-frequency systems these days. As systems get bigger, faster and more complex, computers are being used as the reins as well as the brains—for control as well as data reduction.

The Big Picture. But like the human brain, a computer cannot work independently. It must receive raw information from sensory instruments. Where automatic control is involved, it must transmit its logic to "muscle" instruments which translate decisions into action. The computer is part of a system, and, like the human body, the system functions effectively only when all of its parts are perfectly coordinated. In Honeywell systems, this compatibility of *all* system components is built in, for all Honeywell instruments and controls are *made* to complement each other.

Industry Experience plus Computer Know-How. Equally important, a computer must be properly applied. Computers are "illiterate." They must be told what to do and how to do it by men who know. In engineering a computer-directed instrumentation system that will be precisely matched to your needs, Honeywell systems engineers draw on more than 75 years of measurement and control experience.

Single-Source Responsibility. Honeywell offers you a single contract covering your entire system. You get economy, convenience, simplified training of personnel, economical stocking of parts and accessories—*all* the advantages of single-source purchasing. And you get the only truly complete computer control package available from a single source.

MINNEAPOLIS-HONEYWELL, Wayne and Windrim Avenues, Philadelphia 44, Penna. In Canada, Honeywell Controls, Ltd., Toronto 17, Ontario.

75th YEAR
PIONEERING THE FUTURE

Honeywell

First in Control

SINCE 1885

ALL-THE-WAY NEW

FORD Econoline TRUCKS

*Based on a comparison of latest available manufacturers' suggested retail delivered prices.

ALL-THE-WAY NEW TO SAVE IN 4 BIG WAYS!

New Van Turn an Econoline Van loose on your route and watch delivery costs plummet! Cargo space is up to 57 cubic feet bigger than conventional ½-ton panels! Big double doors at both rear and curb side give real load accessibility! Floor is level, too—no rear engine hump! And there's three feet less length to turn, park, or garage!

New Station Bus Nothing can match this beauty for comfort, room, and low costs! There's room to spare for eight. Converts to load hauling in just a few minutes. And what a load—twice that of the "biggest" station wagons! Best yet, it gives you up to 30 miles on a gallon, and it's priced below even compact station wagons!*

New Pickup Meet a revolutionary new pickup that saves more ways than any truck you've known! Modern cab-forward design pares away over a thousand pounds of dead weight, yet you get as much payload capacity as many standard ½-tonners! It's three feet shorter over-all, yet there's a big 7-ft. box with 73 cubic feet of loadspace! You get lively performance in a proven Falcon Six that can give up to 40% better gas mileage . . . saves up to $215 a year! And, the best news, it's priced below many standard ½-tonners!* See it at your Ford Dealer's!

1. **Low price!** Save from the start with Ford's traditionally low prices!
2. **Up to 30 mpg!** In certified tests, the Econoline Pickup delivered 30 mpg . . . you can save as much as 40% on gas!
3. **Less dead weight!** 1050 pounds less chassis weight, yet carries over ¾-ton payloads!
4. **Bigger loadspace!** 7-ft. box—up to 23% more room, but 3 feet less truck length to handle!

FORD TRUCKS COST LESS

YOUR DEALER'S "CERTIFIED ECONOMY BOOK" PROVES IT FOR SURE!

FORD DIVISION, Ford Motor Company

You can't get rid of atmospheric contamination....

Government Finds Air Grows Dirtier Despite New Preventive Push

* * *

Los Angeles Leads in One Type Of Dirt, Phoenix in Another; Local Groups Confer Today

BY JAMES A. REYNOLDS
Staff Reporter of THE WALL STREET JOURNAL

WASHINGTON—The Government is about to unveil the initial findings of the first systematic attempt to measure the scope and seriousness of a major national problem: Dirty air. A preliminary peek at the findings indicates the problem is indeed serious and

The dry desert air, heavy load of nose-clogging chemicals, it's relatively free from the chemicals pounds which may cause lung cancer, eye smarting, bronchial ills, and other ailments. Not surprisingly, Federal air samplers found the highest concentration of these air-borne chemicals in Los Angeles, fondly called "The Smog Capital of the World" by some of its residents.

Phoenix and Los Angeles are only two of 167 spots across the country, both urban and rural, where the U.S. Public Health Service is regularly taking air samples. The first Federal findings, based on samples pulled out of the air last year, will be made public here during a Government-sponsored National Conference on Air Pollution that starts today.

The Keys and the Capital

Even the layman can see a startling difference in some of the samples tested by the P.H.S. One filter which will be exhibited this week has only a few specks on its white surface; it was used in sampling the pure ocean air in the Florida Keys. Another filter turned dirty brown during its 24-hour run; it came from the nation's capital, where the air is relatively clean—for a big city. But a third filter is caked with jet black grime; it came from Cleveland.

The sampling network, it's hoped, will provide answers to two questions which have long puzzled public health experts: Where is the air dirtiest now? Where is it getting dirtier? Last year's sampling should answer the first question, while subsequent surveys should answer the second one. Once they know the extent of the air pollution problem, officials add, they can intelligently work out an effective air-cleaning program.

"Pollution of the air is an unwanted by-product of progress, and it tends to grow as our cities and industries grow," warns U.S. Surgeon General LeRoy E. Burney. "It is time for us to take stock of what we know and what is being done about air pollution, and to outline a plan which will enable us to keep pace with the growing dimensions of the problem."

This week's conference is designed to speed up the stock-taking process. Air pollution experts from all over the country will analyze the causes and effects of dirty air, and offer proposals for cleaning it up. Dr. Burney hopes the conferees will agree on a 10-year anti- plan which will include specific goals programs and pollution-

Lapp introduced the "Fog-Type" insulator design 35 years ago to answer the demand for an effective means of overhead transmission under conditions of severe atmospheric contamination.

All evidence points to the fact that dirt conditions today are worse than ever before, and that there is no real relief in sight.

Realistic appraisal of the problem dictates the wisdom of ***handling*** dirt conditions, which, for outdoor distribution, transmission and station systems, means ***insulating*** for it.

..... Better insulate for it

Why has Lapp's 35-year concept of Fog-Type design remained the one constant in this much-misunderstood area of insulator behavior? Why have Lapp Fog-Type corrugations become the industry standard design for bushings, potheads and other critical outdoor use?

It is because Lapp Fog-Type design is based on the principle of avoiding leakage flashover by controlling leakage current flow. The extra length of leakage path is also a uniform leakage path. Dry, high-resistance, shielded areas of insulator surface are avoided; instead, there's a maximum exposure of surface to contamination . . . to wetting . . . and to cleaning action of wind and rain. Current flows evenly, voltage is distributed over the surface, leakage flashover is prevented.

Even in most areas of severe atmospheric contamination, Lapp Fog-Type insulators require no cleaning; where they do, cleaning intervals are longer, and cleaning is easier than on other types.

Forward utility thinking now calls for use of Fog-Type insulation on ***all*** systems in sea-shore or urban locations. It pays off in improved service and reduced maintenance costs.

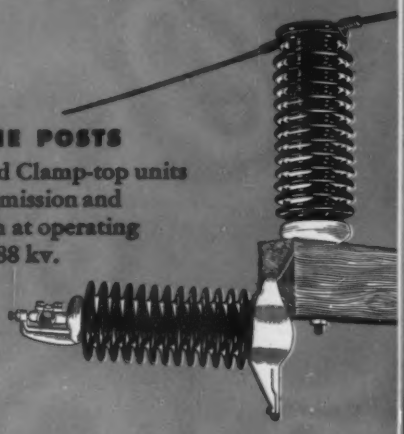
"Fog-Type design" has been a provocative subject over the years. Lapp's viewpoint is explained, and substantiated, in the new Lapp Catalog No. 8. If you have not received a copy, ask for it.

Lapp Insulator Co., Inc.,
LeRoy, New York.

Lapp

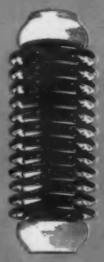
LAPP DISTRIBUTION FOG-TYPE INSULATORS

• Fog pin-types for voltages to 20 kv; Distribution Posts in three sizes for use up to 27 kv; Fog-Type distribution dead end insulators; Distribution switch Posts in four sizes to 150 BIL.



LAPP LINE POSTS

Tie-wire and Clamp-top units for subtransmission and transmission at operating voltages to 88 kv.



LAPP STATION POSTS

Superior electrical and mechanical characteristics for all switch and bus support at voltage ratings to 1,800 BIL.

SUSPENSION FOG-TYPES

Standard strength (15,000-lb.) and high-strength (25,000-lb.) units for 5¾" or 6½" spacing, either ball-socket or clevis type.

no gall at all... with solid coin silver contacts

Now you can count on high pressure solid silver to silver contacts for air disconnect switches with no galling action at the contact areas. Federal Pacific—leader in the design and manufacture of power switches for over 50 years—proudly announces this major improvement: Integral, true coin silver inserts that are harder than hard-drawn copper . . . insure longer, maintenance-free life . . . eliminate the need for multiple parallel contacts . . . permit heavy wiping action for thorough cleaning. Immediately available in group operated switches, vertical break type TG 7.5-330 KV and center side break type YVH 46-230 KV. Write for Bulletin 6900, Dept. FP-6, Federal Pacific Electric Company, Newark 1, N. J.

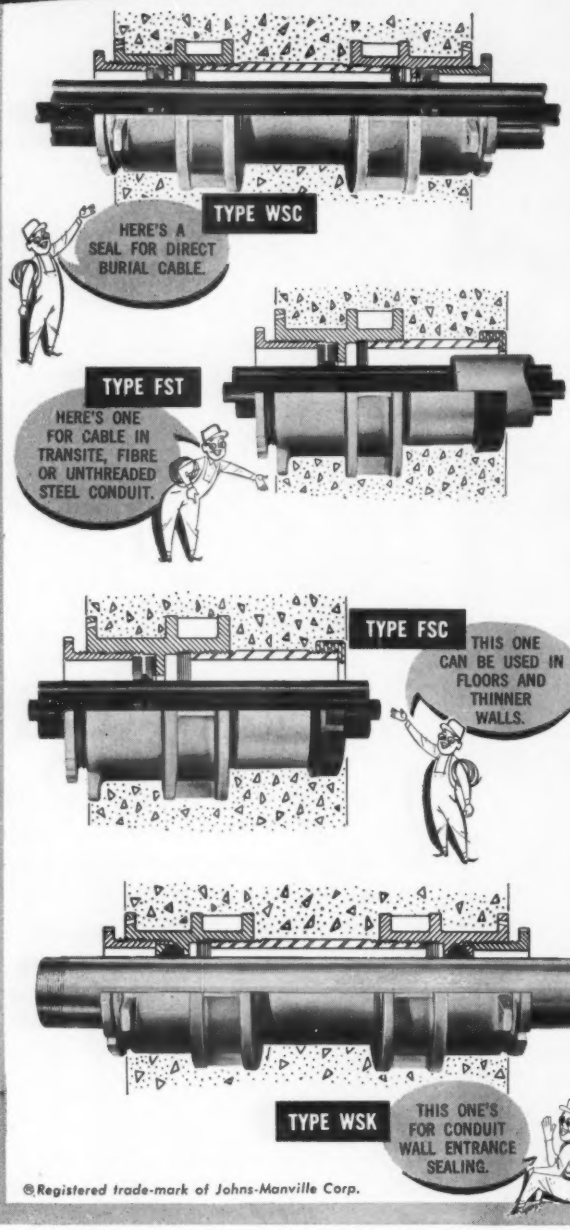
FEDERAL PACIFIC ELECTRIC COMPANY

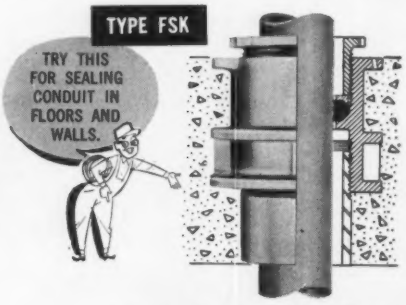
FPE

growth through creative energy

NEW! a complete line of O.Z. WATERTIGHT ENTRANCE FITTINGS for Conduit or Cable

End leakage problems once and for all! O.Z.'s new wall and floor entrance fittings for installation in concrete provide a positively watertight seal around conduit or cable at any pass-through point! Use them with threaded or unthreaded steel conduit, fibre or Transite® conduit, or exposed cables of varying number and sizes. Gland-type sealing assemblies, with pressure bushings, may be tightened at any time. Fittings accommodate conduit ranging from ¾" to 6". Standard types, sizes available from stock. Specials made to order.


TYPE WSC
HERE'S A SEAL FOR DIRECT BURIAL CABLE.
TYPE FST
HERE'S ONE FOR CABLE IN TRANSITE, FIBRE OR UNTHREADED STEEL CONDUIT.
TYPE FSC
THIS ONE CAN BE USED IN FLOORS AND THINNER WALLS.
TYPE WSK
THIS ONE'S FOR CONDUIT WALL ENTRANCE SEALING.



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For more information on fittings and other O.Z. products, call your local distributor, or write to the company.

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O.Z. ELECTRICAL MANUFACTURING CO., INC.
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- CAST IRON BOXES
- CABLE TERMINATORS
- POWER CONNECTORS
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LET'S TALK FUSE LINKS

■ Outwardly most fuse links look very much alike . . . but there the similarity ends! What, then, makes Kearney Fuse Links more dependable . . . more accurate than others? ■ Let's start with construction. All Kearney Fuse Links feature LOW temperature fusible elements and de-ionizing fibre lined tubes. Temperatures inside fuse tube and cutout cartridge always remain well below the fibre charring point . . . even after prolonged service overloads. Thus, the all-important fibre is not impaired by excessive heat . . . fuse tube and cartridge retain their original strength and arc-quenching capabilities necessary for positive full-range fault interruption ■ The exclusive de-ionizing fibre lining and extra strength of the Kearney fuse tube, in effect, make the Kearney Fuse Link a cutout within a cutout when interrupting fault currents up to 600 amperes.* Extra-long, tough, moisture and weather resistant tube provides a longer de-ionization path to clear low faults faster, more positively . . . will not warp or hang up in cartridge. Fuse tube and top terminal are securely joined to prevent loss of expulsion gas pressure ■ Select components, rigid quality control, exhaustive laboratory and substation testing guarantee strict adherence of Kearney Fuse Links to published T-C curves. For positive system protection and accurate co-ordination . . . specify Kearney Fuse Links . . . Standard or Specialized.

*An average figure varying with different fuse ratings.

KEARNEY

for better construction . . . safer maintenance . . . specify KEARNEY products

JAMES R. KEARNEY CORPORATION

4224-42 Clayton Avenue, St. Louis 10, Missouri

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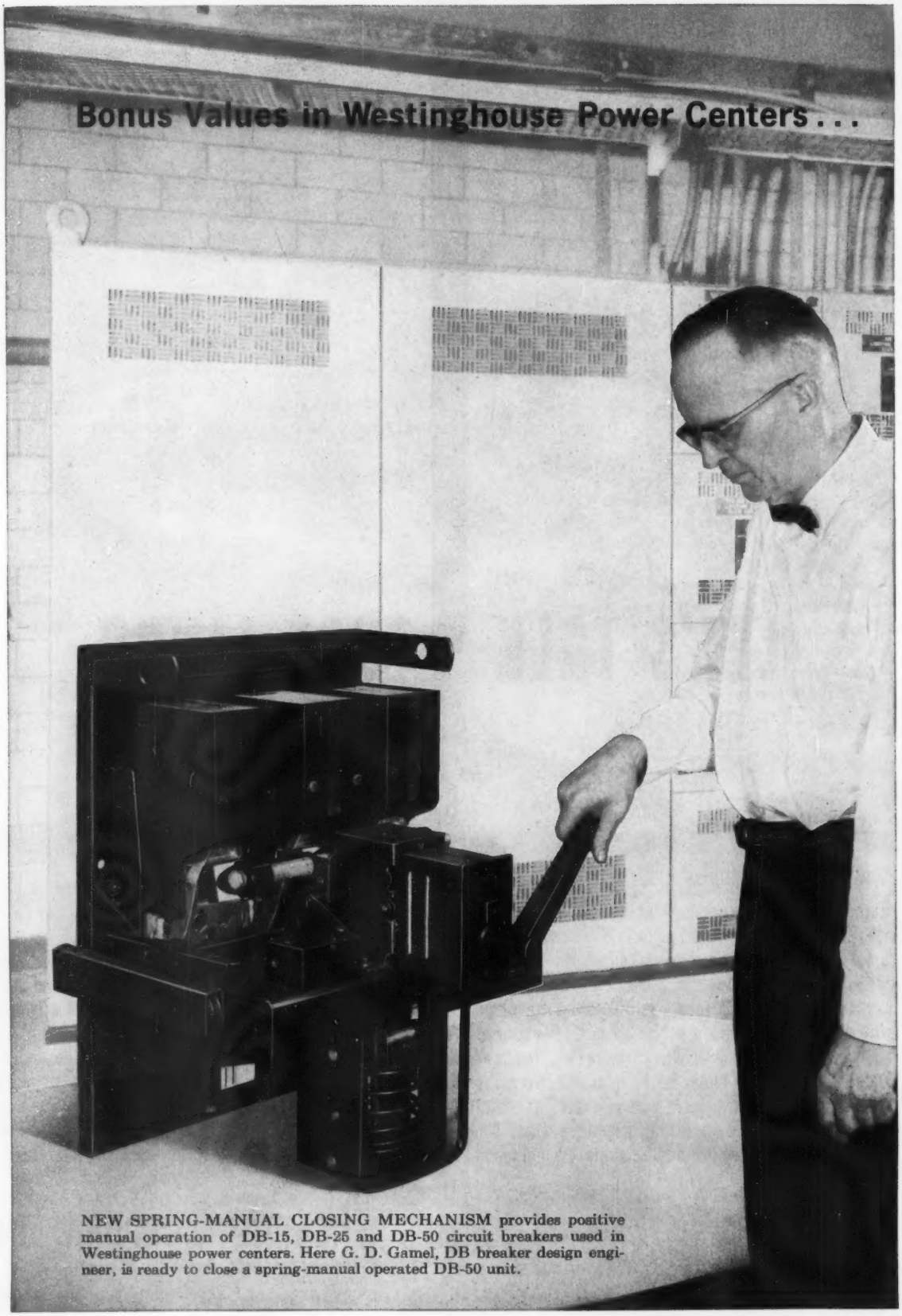


NEW SPRING-MANUAL CLOSING MECHANISM provides positive manual operation of DB-15, DB-25 and DB-50 circuit breakers used in Westinghouse power centers. Here G. D. Gamel, DB breaker design engineer, is ready to close a spring-manual operated DB-50 unit.

Westinghouse power centers offer greatest component selection . . . plus new switchgear insulation

You Can Choose the Breaker Operation You Need. Low-voltage air circuit breakers (DB-15, DB-25 and DB-50) provided in Westinghouse power centers are now available with a choice of manual, spring-manual or electric closing mechanisms. In accordance with industry standards, DB-75 and DB-100 breakers are available with an electrically operated closing mechanism only.

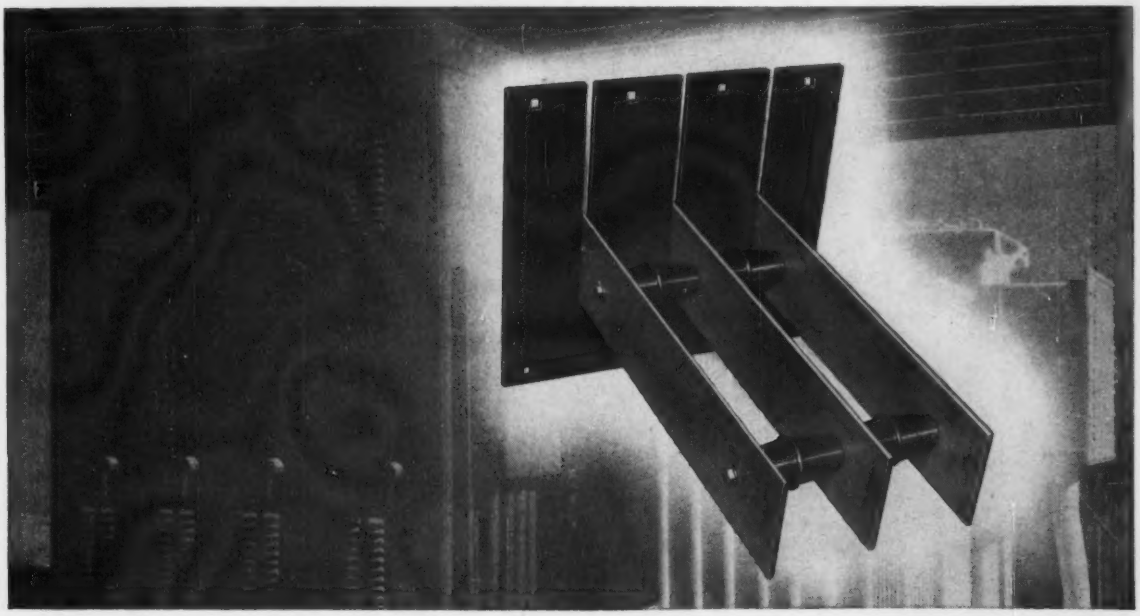
You Can Choose the Transformer You Need. As with breaker closing mechanisms above, Westinghouse gives you complete freedom of choice in selecting the power center transformer best suited to your application. Within code limitations, you can choose *oil-filled* for outdoor service . . . *Inerteen®-filled* for outdoor or indoor service where a nonflammable, liquid-cooled transformer is desirable . . . *ventilated dry-type* for maximum safety and minimum maintenance under controlled atmospheric conditions, indoors . . . and *sealed dry-type* for complete safety and virtually no maintenance, under adverse atmospheric conditions, indoors or outdoors. All dry-type transformers are equipped with low-ratio RM lightning arresters.

New Westinghouse Insulation of improved glass polyester material is used for bus supports and short circuit bracing in Westinghouse low-voltage metal-enclosed switchgear. In addition to being highly track resistant, this new insulation is also flame retardant, and the design of supports and bracing provides increased vertical creepage distances. Result is maximum safety with minimum maintenance.

These features are only a few of the continuing product improvements that provide true bonus values beyond specification in Westinghouse power centers. For complete details, call your Westinghouse representative—or write Westinghouse Electric Corporation, P.O. Box 868, Pittsburgh 30, Pa. J-60979-R

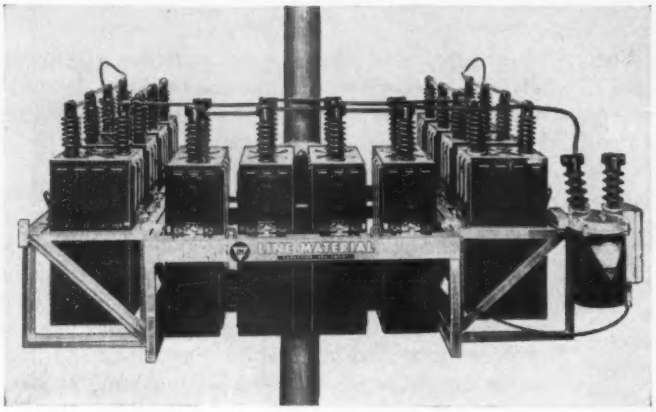
YOU CAN BE SURE...IF IT'S **Westinghouse**

NEW WESTINGHOUSE GLASS POLYESTER INSULATION is used for bus supports and bracing in low-voltage metal-enclosed switchgear of Westinghouse power centers.



SPECIFY ALUMINUM IN

...it improves performance,



Aluminum in Capacitors and Racks

Aluminum's ability to be rolled to very thin gauges, plus its low cost and high electrical and thermal conductivity, make it an ideal material for capacitor windings. Capacitors with aluminum windings improve the power factor of utility systems—mean lower losses, more economical operation. And in capacitor racks, aluminum's strength, corrosion resistance, and light weight are key advantages. Aluminum racks require practically no maintenance, are easy to handle and install and assure a durable, attractive installation.

Photo courtesy of Line Material Company

Aluminum in Generators

In turbine generators, aluminum is one of the few materials versatile enough to be used as an electrical conductor in field windings, as a mechanical or structural material in fan blades and vanes and inlet guide castings, and in terminal plates and rotor coil slot wedges. Aluminum's light weight advantage in turbine generators is important to utilities because it helps reduce centrifugal forces, and makes possible larger generators with increased KVA ratings.

Photo courtesy of Louisville Gas and Electric Company

ELECTRICAL EQUIPMENT

reduces weight, cuts costs

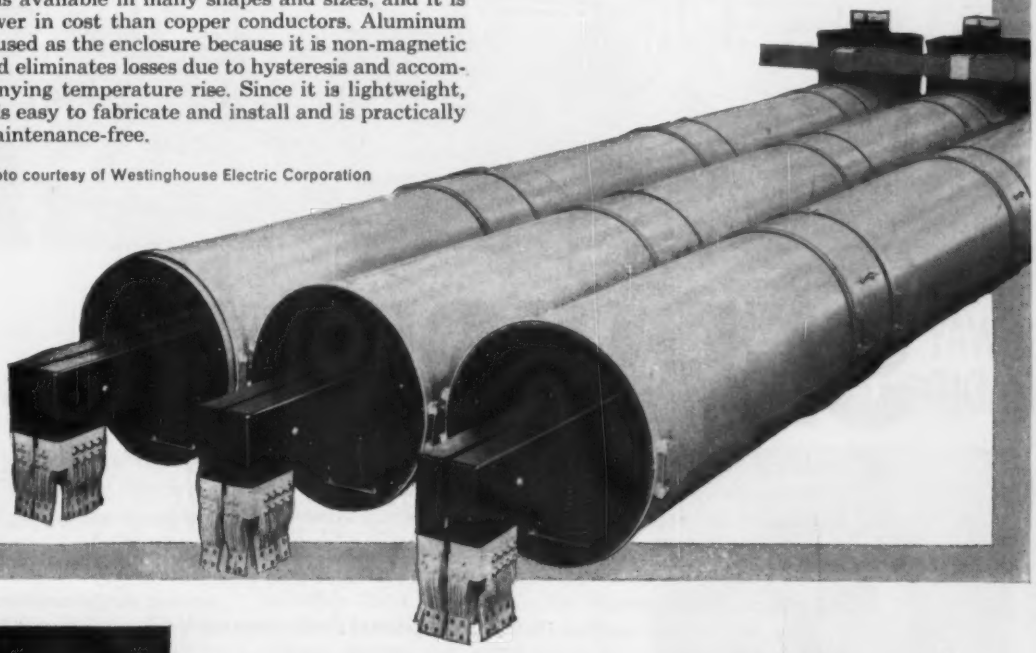
Regardless of whether you purchase or manufacture electrical equipment, aluminum's unique combination of advantages can be of value to you. Some of these advantages are: low cost, minimum maintenance, easier installation, attractive appearance, high electrical conductivity, light weight, resistance to corrosion, high thermal conductivity, strength, ease of fabrication, good availability and high scrap value.

Reynolds engineers are available to help translate these advantages into better products for the electrical industry. Contact your nearest Reynolds office or write *Reynolds Metals Company, P. O. Box 2346-EL, Richmond 18, Virginia.*

Aluminum in Isolated Phase Bus

Aluminum offers both the user and the manufacturer many advantages in isolated phase bus systems. As the bus conductor aluminum offers high electrical conductivity, it is light in weight, it is available in many shapes and sizes, and it is lower in cost than copper conductors. Aluminum is used as the enclosure because it is non-magnetic and eliminates losses due to hysteresis and accompanying temperature rise. Since it is lightweight, it is easy to fabricate and install and is practically maintenance-free.

Photo courtesy of Westinghouse Electric Corporation



REYNOLDS ALUMINUM

Watch Reynolds new TV show "Harrigan & Son", Fridays; also "All Star Golf", Saturdays—ABC-TV.

2-WAY RADIO SERVICE

Remember, too, that Motorola is a maintenance organization . . . with the largest service force specially trained to maintain 2-way radio systems to factory standards. No matter how large your radio system is—how widely distributed your mobile radios are—Motorola can provide system maintenance specifically tailored to your requirements.

For example, one company serviced by Motorola has more than 500 mobile units, 43 base stations and a 200-mile microwave system.

You, too, can have confidence in the service provided under a Motorola Maintenance Agreement. Write today for full details.

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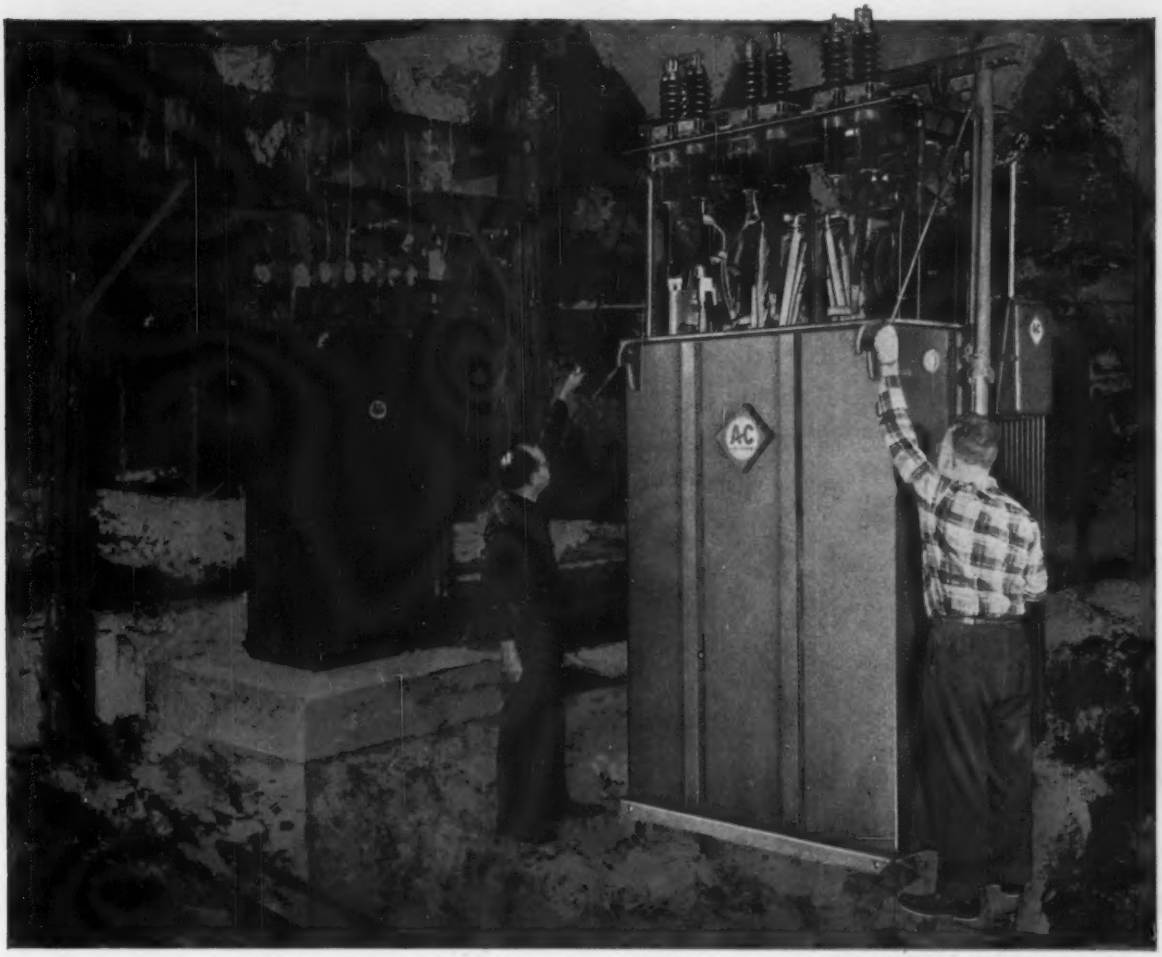
ALLIS-CHALMERS

ORIGINATORS OF 5/8% STEP REGULATORS



SFR Feeder Voltage Regulator

Only exclusive unit construction delivers

extra regulator values you can see

Why is unit construction so important to regulator users? Simply because this design is *basic* to these many other extra-value A-C features *you can see*...advantages you can't find on any ordinary regulator!

You'll see continuous leads passing directly from the coils to the double-bolt terminals on the dial switch.

You'll see 78 fewer bolted connections only unit construction can offer. No leads to disconnect, no terminals to remove when you untank.

You'll see better workmanship, since all connections are securely made and double-checked *before* unit is tanked!

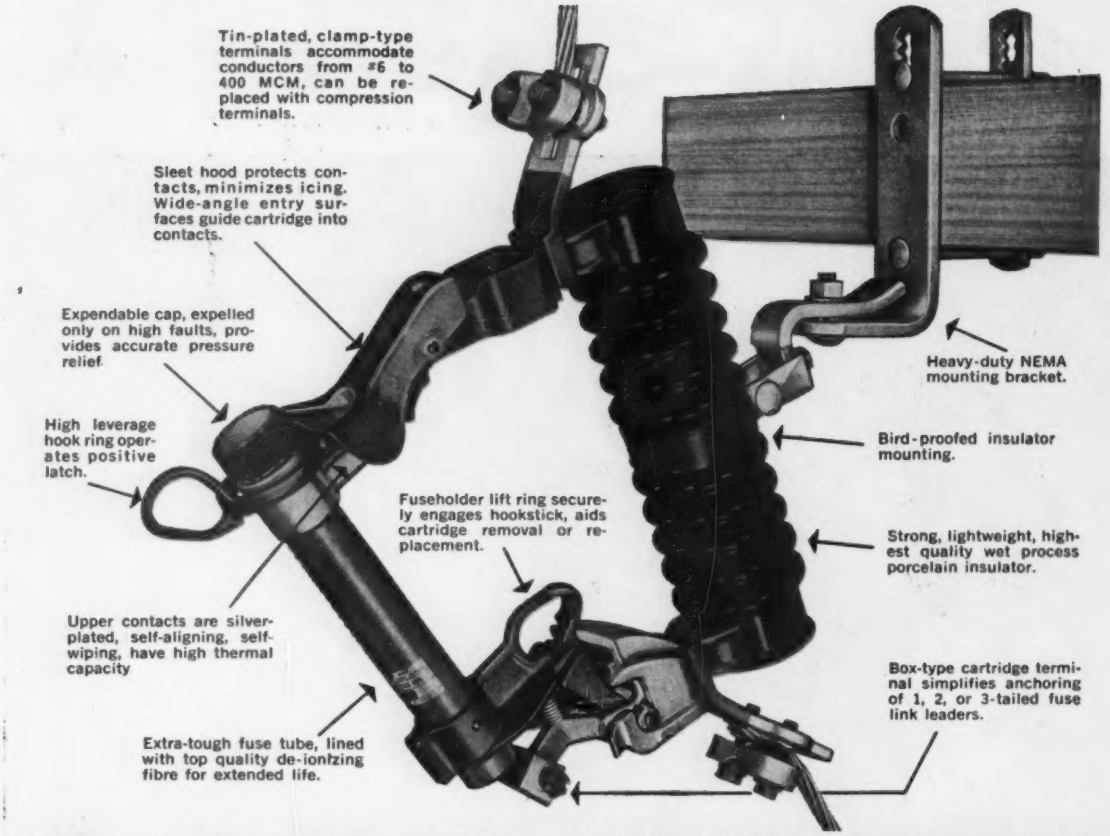
You'll see how much easier inspections can be. To untank, remove cover bolts and control compartment retaining nuts. Then lift entire assembly from the tank... there's no need to remove oil.

Your nearby A-C office has the facts on single and three-phase sizes from 2,400 to 69,000 volts... in ratings up to 2,500 kva. Or write **Allis-Chalmers,** Power Equipment Division, Milwaukee 1, Wisconsin.

A-1379

Caliband is an Allis-Chalmers trademark.

CALIBAND control — At the twist of the control knob, you can set or test voltage level and band width without changing voltage or interrupting regulated service.


Tin-plated, clamp-type terminals accommodate conductors from #6 to 400 MCM, can be replaced with compression terminals.
Sleet hood protects contacts, minimizes icing. Wide-angle entry surfaces guide cartridge into contacts.
Expendable cap, expelled only on high faults, provides accurate pressure relief.
High leverage hook ring operates positive latch.
Fuseholder lift ring securely engages hookstick, aids cartridge removal or replacement.
Upper contacts are silver-plated, self-aligning, self-wiping, have high thermal capacity
Extra-tough fuse tube, lined with top quality de-ionizing fibre for extended life.
Heavy-duty NEMA mounting bracket.
Bird-proofed insulator mounting.
Strong, lightweight, highest quality wet process porcelain insulator.
Box-type cartridge terminal simplifies anchoring of 1, 2, or 3-tailed fuse link leaders.

NEW KEARNEY 200 AMP "HX" CUTOUT

Kearney substation-proved to positively and repeatedly interrupt 12,000 amperes at 7.8 KV... 10,000 amperes at 15 KV

- No "blind" spots... a highly efficient combination of single end venting and expendable cap double venting insures dependable interruption throughout the entire fault range... from low current values to maximum rated capacity of the cutout.
- On low and medium faults, expendable cap remains intact... tube vents only at bottom. Controlled spring loading and long travel of lower hinge toggle whips fuse cable out of cartridge to insure positive low current interruption.
- Expendable cap is expelled only on high faults. Resultant double end expulsion in line with fuse tube relieves gas pressure, equalizes interruption shock forces and prevents damage to cutout or bracket.
- Switchstick-operated positive latch prevents accidental cartridge dropout due to vibration, impact, or magnetic forces.
- Strong, durable, non-ferrous construction for long life, optimum performance. All current-carrying parts copper alloy. Silver-plated contacts. Stainless steel pins and springs.
- Fuseholders accept all conventional button-type links.
- Kearney "HX" Fuse Cutouts are available on single insulator, NEMA station-post, or centerbolt insulator mountings; also in 100 ampere continuous ratings.

Ask your Kearney Sales Representative for full information or write for "HX" Cutout Bulletin

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for better construction... safer maintenance... specify KEARNEY products

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SILICONE NEWS from Dow Corning

Blueprint for Reliability

For Performance Plus... Specify Silicone Insulated Transformers

Here's Why—(1) ***Low cost installation*** . . . transformers using silicone insulation systems are up to 50% lighter, 50% smaller and require no costly vaults or barriers. (2) ***Lower operating costs*** . . . silicone insulated transformers are virtually maintenance-free — have no liquids to filter or change — need no space heaters to keep de-energized windings dry. (3) ***Maximum safety*** . . . silicone insulated transformers are completely dry. There's no danger of toxic fumes, or fire. (4) ***Maximum reliability*** . . . silicone insulated transformers operating at 200 C have a longer life expectancy than Class A transformers operating at 100 C. Depending on design, silicone insulated transformers withstand overloads of 25 to 50% above rated capacity. Units have been flooded without damage to windings.

Here's How — Dow Corning silicone insulation has excellent electric strength and is unaffected by thermal cycling and high temperature . . . enables transformer manufacturers to (1) produce lighter, more compact units — units that double capacity without increasing space or weight requirements; or (2) build units that withstand substantial overloads.

Here's What — Silicone insulated dry-type transformers in three enclosures: (1) open, (2) enclosed and (3) gas-filled sealed.

Here's Where — For power station auxiliaries, a choice of enclosed, open or sealed gas-filled dry-type transformers — and, for underground distribution systems, sealed gas-filled dry-type transformers.

Here's When — Right now! Whether you are planning for future growth, expanding present facilities or replacing old equipment, consider the possibility of using silicone insulated transformers. Initial price is competitive, and, when you consider their lasting values, silicone insulated transformers give you more for your money . . . a whole lot more!

Write today for 8 page brochure entitled "Specify Silicone Insulated Motors and Transformers and Save!"

You Save by Specifying Silicone Insulated Transformers. Write Dept. 3111.

first in silicones

Dow Corning CORPORATION
MIDLAND, MICHIGAN

ATLANTA BOSTON CHICAGO CLEVELAND DALLAS LOS ANGELES NEW YORK WASHINGTON, D. C.

ATTRACTIVE APPEARANCE . . . SUPERIOR PERFORMANCE

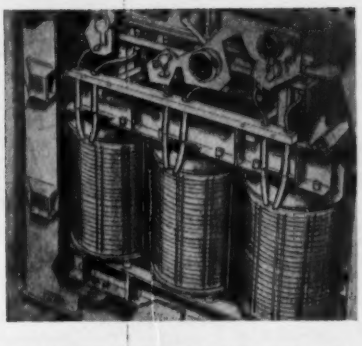
With Westinghouse unit substations, you always get ace-high performance. Switchgear and transformer are engineered as a unit—to work together for reliable, trouble-free service.

In addition, these quiet substations are good looking. Adaptable to small land plots, they are "good neighbors" in residential, commercial and industrial areas. Safe, too. Metal-enclosed construction keeps out unauthorized personnel, protects against external hazards.

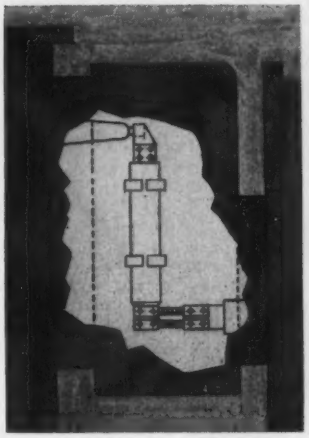
Installation is simple. Westinghouse unit substations are factory-coordinated, eliminating installation complications. They are shipped in sections . . . require only bolting together and connection of incoming and outgoing lines.

Call your nearest Westinghouse representative for all the facts . . . or write Westinghouse Electric Corporation, P.O. Box 868, Pittsburgh 30, Pa. You can be sure . . . if it's Westinghouse.

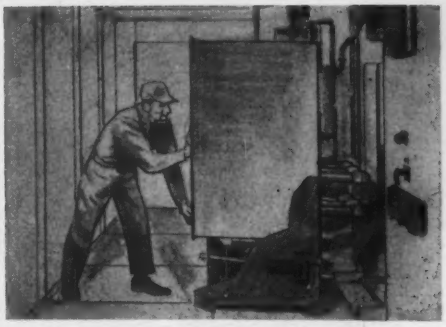
Westinghouse



TRANSFORMER FEATURES: *New Super Insuldur® Insulation System* enables transformer to handle 12% more kva load with no reduction in normal service life. • *Hipersil® Core* carries 1/3 more flux than ordinary electrical steel per unit area. • *De-energized Tap Changer* makes matching of line voltages quick and convenient when transformer is de-energized. • *Impulse Coordinated.*



BOX-TYPE THROAT CONNECTION includes provision to compensate for minor misalignment between transformer and switchgear as a result of foundation differences.



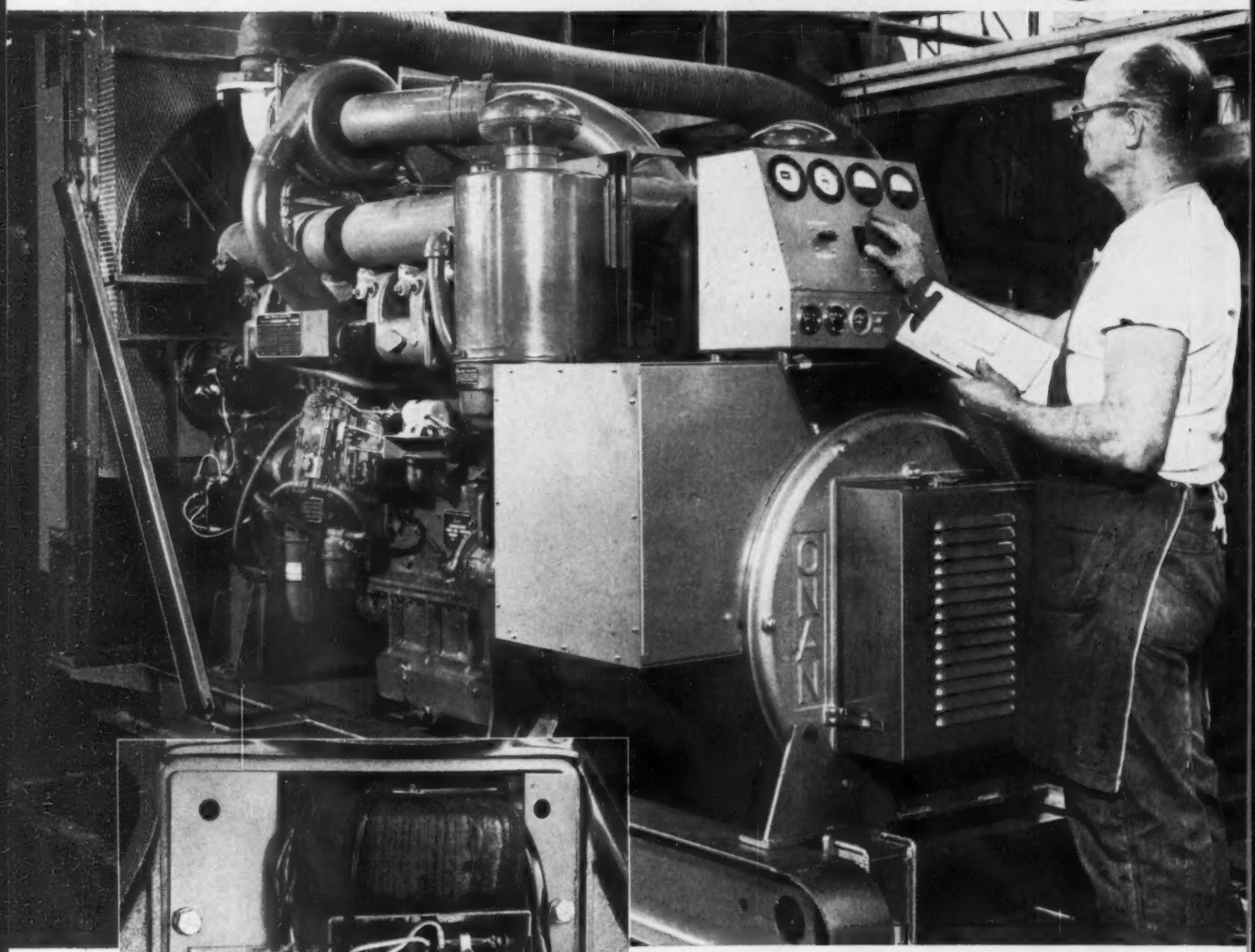
SWITCHGEAR FEATURES: *DH Magnetic Air Circuit Breakers,* with De-ion® arc interruption, assure superior circuit protection. • *Horizontal Drawout DH Breakers* permit ease of inspection, maintenance and breaker interchange. • *Limitrak* Insulation System* provides balanced insulation protection with superior nontracking characteristics. • *Shelterfor-M* Design* furnishes roomy, protected aisle space for personnel and equipment for inspections, maintenance or breaker interchange under all weather conditions.

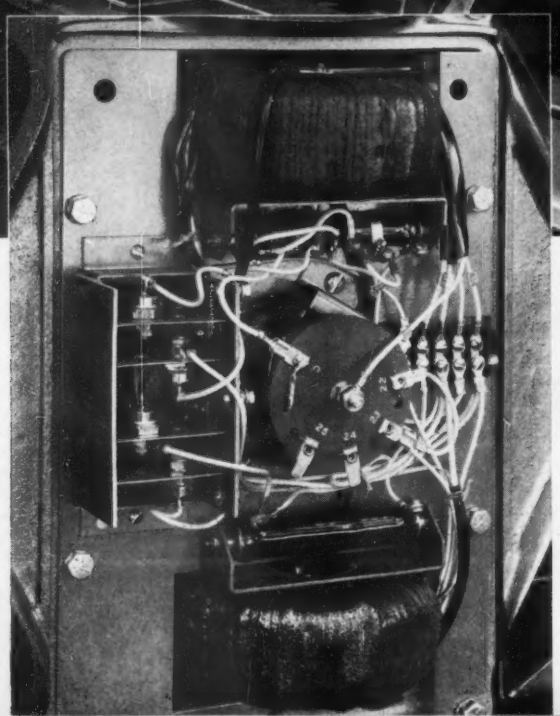
*Trade-Marks

J-61008

Pour on the load!

recovers voltage





Use Magneciter-equipped Onan for standby or primary power. Takes maximum starting load without hesitation! Available on all diesel and gasoline-powered Onan Electric Power Plants rated at 25 KW and up.

Static exciter and magnetic amplifier and regulator of Magneciter Generator with cover removed. No moving parts in this *static* exciter and regulator. No extra sensitive adjustments needed. Magneciter means reliability!

Onan Magneciter within 1 second

Even when maximum starting load is applied, Onan Magneciter gives voltage recovery 5 times as fast as ordinary rotating exciter generator

When a heavy starting load causes a voltage dip, the Onan Magneciter Generator restores full voltage within one second. Old-fashioned rotating exciter generators take more than five times longer. Furthermore, Onan Magneciter has no moving parts in its exciter and voltage regulator, thus eliminating hundreds of potential causes of wear.

It's no longer necessary to buy a generator much larger than your normal power needs just to get enough extra power for the heavy drain of starting motors. Onan gives you this margin of power, builds it into every Magneciter-equipped Onan Electric Plant.

Every Onan Electric Plant is given hours of running-in and testing under load before it is shipped. An independent testing laboratory retests Onan Plants and certifies Onan testing methods—double assurance that every Onan lives up to its nameplate rating. Only then can Onan qualify for its Performance Certification.

Every Onan is ready to give you long-lasting performance and operating economy. See your Onan representative. You'll find him in the Yellow Pages. Or write direct.

ONLY ONAN GIVES YOU THIS CERTIFICATION

PERFORMANCE CERTIFIED
We certify that when properly installed and operated this Onan electric plant will deliver the full power and the voltage and frequency regulation promised by its nameplate and published specifications. This plant has undergone several hours of running-in and testing under realistic load conditions, in accordance with procedures certified by an independent testing laboratory.
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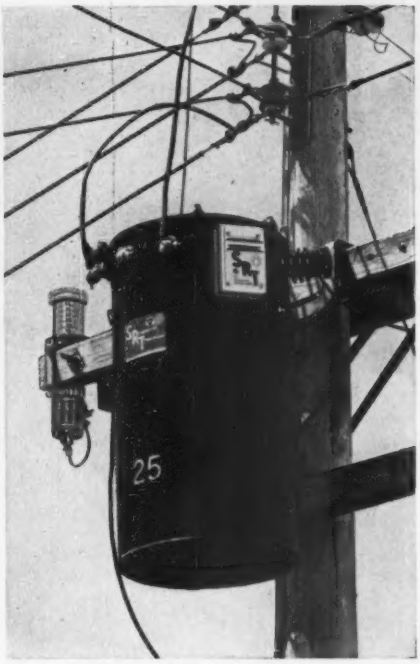
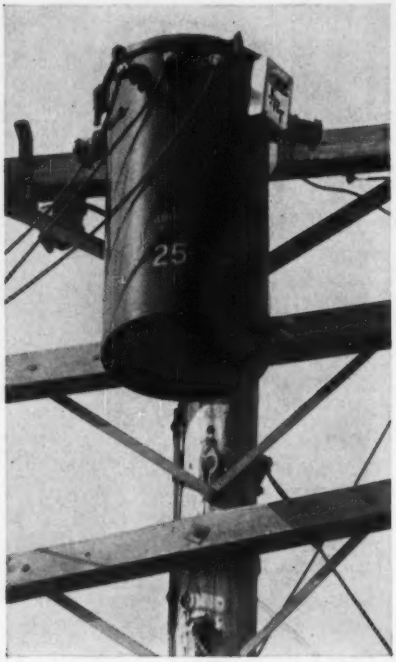
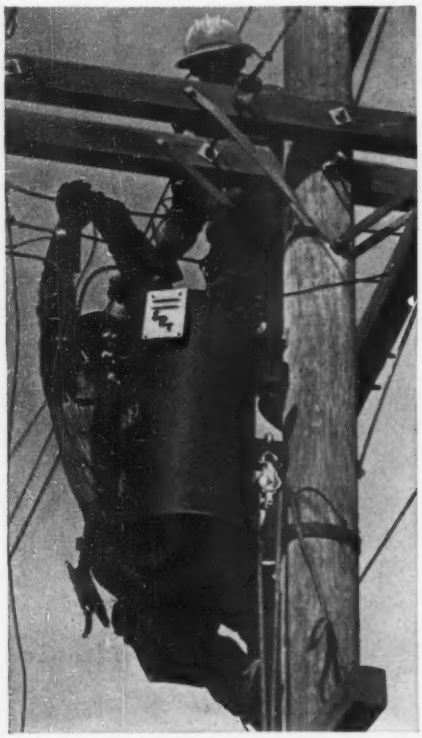
You Be the Judge
Of Transformer Values



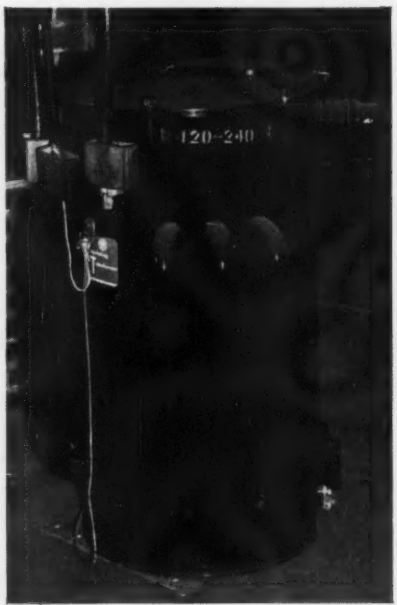
This 2400/4160 volt, 25 kva electronic SRT serves 20 lake cottages at Hillsdale, Michigan. While 10 of these cottages are fully occupied year-'round, the remaining 10 are occupied only on weekends at which time the secondary voltage varies from 118 to 126 volts. Although the line is served directly from the plant with no line regulation, the electronic SRT has maintained secondary voltage at 122 volts ± 1¾ volts.



Sensitive electronic communication equipment, demanding a fairly even voltage level, is being supplied by this 4800 volt, 25 kva electronic SRT. Service has been completely satisfactory.

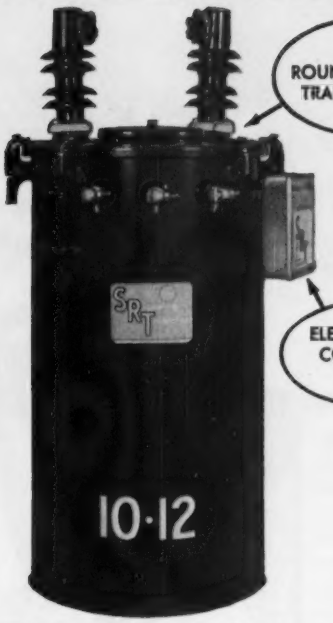


Another electronic SRT being installed! This one, a 7620 volt, 25 kva unit on Public Service Company of Colorado lines, will serve a trailer park and resort area.

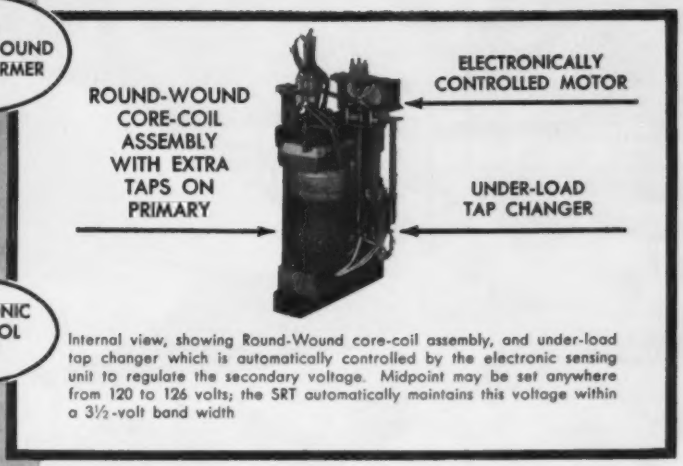


Cleveland Electric Illuminating Company uses this 37½ kva SRT in a vault to supply regulated 121 volt secondary power from a 4340-volt primary feeder. Although voltage on the primary varies from 4160 to 4500 volts, the SRT holds secondary voltage at the desired level selected.

Puget Sound Power & Light Co., has successfully used this 25 kva SRT for two years to supply regulated power to a remote Pacific Telephone & Telegraph Company microwave installation located high in the Cascade Mountains. Maintained voltage is 120 volts, plus or minus 1¾ volts.



SRT simply replaces conventional transformer where you have a regulation problem. It requires no extra pole space, no additional wiring. Note the new electronic unit—mounted externally where it is not affected by oil temperature changes, and is easily accessible for changing midpoint settings if desired.



Internal view, showing Round-Wound core-coil assembly, and under-load tap changer which is automatically controlled by the electronic sensing unit to regulate the secondary voltage. Midpoint may be set anywhere from 120 to 126 volts; the SRT automatically maintains this voltage within a 3½-volt band width

L-M's Electronic SRT®

Now in Full Production For Immediate Delivery

L-M's exclusive Self-Regulating Distribution Transformer fully tested in actual service for two years. Now new electronic control on the SRT® offers greater flexibility in the field, easier accessibility, longer expected life.

The Self-Regulating Transformer, developed by Line Material and put on the market in limited quantities two years ago, has been highly successful. By regulating right at the point of use, the SRT can solve both low-voltage and over-voltage problems and can provide better service for utility customers. Thus it greatly reduces customer complaints caused by voltage variations. Under most conditions, the SRT is the most economical means of voltage correction. In addition, extensive utility tests have proved the SRT reliable and efficient.

How the SRT Operates

The SRT requires no additional pole space, no extra wiring. Instead, the SRT contains, in one tank, a distribution transformer with extra taps on the primary, a regulating mechanism that is volt-sensitive on the secondary, and an automatically operated under-load tap changer on the primary. As secondary load fluctuates, the tap changer switches primary turns in or out to keep secondary voltage within a 3½-volt band width around a predetermined 120 to 126 volt midpoint.

Now With New, Field Tested Electronic Control

The SRT was originally equipped with a hydraulic operating unit that proved extremely dependable and accurate. Further work by L-M research engineers has resulted in an electronic solid state control that thorough field testing shows is not only exceedingly accurate, but also completely flexible. It may be adjusted to any desired mid-point voltage while the transformer is operating without the use of instruments.

Since the electronic unit is external to the tank, its components, therefore, are not affected by high oil temperatures associated with transformer loading. In addition, the total absence of moving parts assures life expectancy comparable to that of the transformer without need for periodic inspection.

Get Complete Details on SRT

Ask your L-M Field Engineer to show you reports from utility companies having extensive experience with the SRT, and details on its operation and application. Or write Line Material Industries, Milwaukee 1, Wisconsin.

YOU BE THE JUDGE OF SRT VALUE

Ask the L-M Field Engineer to present the evidence of value of the cool-running Round-Wound® Transformer, and the great new Electronic control. Then you be *the judge!*

LINE MATERIAL® Industries

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Distribution Transformers

McGRAW EDISON

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DISTRIBUTION TRANSFORMERS • RECLOSERS, SECTIONALIZERS AND OIL SWITCHES • FUSE CUTOUTS AND FUSE LINKS • LIGHTNING ARRESTERS • POWER SWITCHING EQUIPMENT
PACKAGED SUBSTATIONS • CAPACITORS • REGULATORS • OUTDOOR LIGHTING • LINE CONSTRUCTION MATERIALS • PORCELAIN INSULATORS • FIBRE PIPE & CONDUIT

Line Material Introduces STYLED MERCURY Luminaires

Line Material's distinctively new 1000 and 700 watt LINE 2E2 mercury luminaires offer superior lighting and elegant daytime appearance. The fresh modern styling complements and enhances the surrounding landscape and architecture.

A powerful, efficient optical system featuring Holophane's latest refractor provides unprecedented lighting quality.

Lustrous aluminum finish and five pastel decorator colors are available to add unique beauty to your lighting installations.

Ask your L-M Field or Lighting Engineer for complete details, or write to Line Material Industries, Milwaukee 1, Wisconsin.

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Dynamically elegant
Progressively styled
Handsomely modern
Gracefully unique

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Outdoor Lighting

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DISTRIBUTION TRANSFORMERS · RECLOSERS, SECTIONALIZERS AND OIL SWITCHES
FUSE CUTOUTS AND FUSE LINKS · LIGHTNING ARRESTERS · POWER SWITCHING EQUIPMENT
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LINE CONSTRUCTION MATERIALS · PORCELAIN INSULATORS · FIBRE PIPE AND CONDUIT

Electrical World
NOVEMBER 7, 1960

Editorial Comment

Electrical World's Position on Non-Investor-Owned Power-II

In last week's Editorial Comment, *Electrical World's* fundamental position on non-investor-owned power was set forth. In essence, it is:

- Investor-owned companies should serve wherever ready, willing, and able.
- Federal power is basically wrong; non-federal entities should develop power at federal multi-purpose sites.
- Communities and rural areas have the right to choose between investor and non-investor-owned service.
- Where they choose the latter, or where federal power exists, taxes, financing, regulation and privileges should be equal to those for an investor-owned company operating under the circumstances.
- Subsidies in the form of tax forgiveness and aided financing are proper for a rural system during early system development, but should be withdrawn as soon as the supplier can stand on its financial feet.

The key words above are "should" and "have." We firmly believe that investor-owned companies *should* serve wherever ready, willing and able. But communities and rural areas *have* the right to choose; this is a basic right, based on the franchise-granting powers of the citizenry for enterprises operating in the public interest.

We do not dispute this right; we support it whole-heartedly. We do yearn for a millenium when there would be no tax, financing, regulatory or privilege inequities between the alternates being considered; and when the citizens have *all* the competitive facts before them, without varnish or bias, when they make their decision.

Yet it is naive to pretend that inequities do not exist, or that all of the competitive facts can be presented in a form readily grasped by the citizens. Inequities *do* exist; protagonists on each side *do* present their cases in varnished form and with bias aforethought.

Our goal is complete removal of the inequities. But we recognize that the *wholesale* turnover of the whole complex system of taxing, finances, regulation and privilege that would be needed does not seem to be just around the corner.

Too much is deeply rooted in law. Too much has been driven deep into our social structure.

Nevertheless, we stand on the principles stated in last week's Editorial Comment and repeated above. We will aid in the fight to achieve them wherever possible.

This is why, over a year ago, we supported the TVA self-financing legislation. Though we are against federal power, and wish that TVA didn't exist, it *does* exist; as a power system, it does a good job. Whether we like it or not, it has *de facto* utility responsibility for power supply to its area. And the new provisions of the law remove at least a portion of the financing—and the boundary restriction—inequities.

If non-federal entities were to come forward to propose purchase of federal equities in TVA, we would support them. They have not. So we have supported removal of some of the inequities.

Similarly, we wish it had not been necessary for subsidized cooperatives to form, to bring rural power in many areas. But where investor companies did not or could not step forth, the co-ops *did* form, and many of them have done a fine job. However, we have urged those solvent co-ops to reject their subsidized status so often needed in their early days, and to accept the mantle of equal tax and financing status, and we will continue to do so.

Meanwhile, we believe that cooperation between investor-owned utilities and co-ops is mandatory in this day and age. We believe that the citizen will be best served in the long run when neighboring systems, from whatever ideology they stem, work together actively to reduce costs.

Nuclear Reprocessing Plant Okayed

AEC promises enough government business to provide base for commercial operation. Electric utilities are participating

The Atomic Energy Commission has agreed to help Davison Chemical Division of W. R. Grace & Co start a major nuclear power fuels reprocessing plant.

An informal commitment from AEC staff officials was given to Davison for turning over spent fuel rods from government reactors to make up a sufficient commercial base for the proposed private plant's operation. Out of a 200-day annual plant operating load (at a reprocessing rate of 1 ton per day), AEC will provide 75 days of the load from government-owned reactors.

The decision was reached after Davison met with the AEC staff Oct. 27 at Germantown, Md. Results of a $250,000 study (involving no government funds) just completed by Davison showed economic feasibility of an up-to-date reprocessing plant located somewhere east of the Mississippi. Estimated capital cost of the plant will be about $25 million, and will be totally financed by Davison.

Two Utilities Change Plans

In undertaking the study to determine economic attractiveness of a commercially-owned and operated reprocessing facility, Davison had combined with five private utilities to form Irradiated Reprocessing Group. After completing the study, however, Davison was told by two of the IRG utilities that they did not favor going ahead with engineering design of the plant—as the next step in Davison's plans.

The two IRG utilities wanting to defer building plans are Commonwealth Edison and Yankee Atomic. Of the three other utilities in IRG, Consolidated Edison and Northern States Power favor construction of the plant. A special consultant hired by Detroit Edison has approved the Davison plant on economic grounds for reprocessing the Fermi fast breeder spent fuel elements.

At the Commission meeting in which Davison reported the economic findings of its study, T. C. Runyon, manager of Davison's Erwin, Tenn., plant, also indicated possible additional financing of the plant by Westinghouse:

"The study has been completed and we think technical and economic feasibility is demonstrated. Although this opinion is generally shared by all IRG members, two (Commonwealth and Yankee) would like a two-year delay for reasons of schedule and load. Meanwhile, Davison has approached additional companies and utilities. One is Westinghouse. And without any indications of an answer, top Westinghouse officials are now exploring the possibilities."

If the IRG power fuel reprocessing business proposal is finally rejected as uneconomic by the boards of all the five utilities, the Commission will then establish alternative means to reprocess the utilities' fuel elements in AEC facilities.

AEC has been trying since 1956 to interest private industry in doing reprocessing—and for those in the chemical and utility industries anxious to have spent fuel elements processed in a privately owned facility, the mounting hesitancy of the utilities to support the IRG proposal comes as a great disappointment. J. F. Fairman, executive vice president of Consolidated Edison, has been at the forefront in urging the utility industry to solve its own nuclear fuel reprocessing problems.

The IRG study found that a plant with a 1-ton per day capacity operating 300 days per year would be economical by early 1964 at prices 20% higher than AEC processing prices. AEC prices, based on the commission's 1959 interim processing program price schedules, are $15,300 per ton per day (original estimate); on straight-line escalation, $16,850 by July, 1960; up to $19,950 by 1968.

It was determined, however, that a 200-day annual work schedule would sustain the IRG proposed plant operation, including a slight business profit. The IRG study anticipated that 150 days of the 200-day load would be about the maximum during the first two years that could be furnished by the utilities. With 75 days from AEC reactor cores, the plant would have a work load backlog of 25 days to assure non-interrupted operation.

Spokesmen for the Commission say they will not await future developments on the IRG proposal before forming a final position.

AEC staff recommendations concerning the commission's reprocessing obligations—if IRG negotiations fail—will aim at construction of facilities to do the processing job (including integration of research-development program) at minimum costs. All reprocessing construction is now suspended by AEC pending resolution of IRG intentions.

Concentration of all processing at AEC's Savannah River, S. C., and Arco, Idaho, facilities has been given staff consideration. AEC has carried out, on an interim basis, experimental and research reactor fuel element reprocessing at Oak Ridge; slightly enriched elements (including the Dresden spent elements if IRG plans fall through) at Hanford; highly enriched at Arco; and medium, 27% enrichment (including Enrico Fermi, Canadian NRX and NRU reactor elements) at Savannah River.

Canadian Utilities Apply For Power Export to US

Canadian Niagara Power Co and the Hydro-Electric Power Commission of Ontario have applied for licenses to export power to the United States on a long-term basis.

Both want to export power to the Niagara Mohawk Power Corp and Power Authority of the State of New York. Canadian Niagara is a subsidiary of Niagara Mohawk.

Ontario Hydro wants to export 25-cycle power to Niagara Mohawk and "excess" power to both Niagara Mohawk and PASNY. Canadian Niagara wants to export 25-cycle power and "excess" power to its parent company.

Hamil: Co-ops See Territorial Disputes as Biggest Issue

REA administrator tells EW editor co-ops are indifferent to 'giant power,' less rigid on 2% money

■ Learning that REA Administrator David Hamil would be appearing before a number of regional meetings of the National Rural Electric Cooperative Assn this fall, *Electrical World* asked him to make special note of questions in the minds of the people he met. Here are his impressions.

Hamil had spoken with nearly 3,000 rural electric system leaders and farmers, at six NRECA regional meetings, when *Electrical World* interviewed him. These meetings were in Hot Springs, Ark.; Clarksburg, W. Va.; Ocean City, Md.; Atlanta, Louisville, and Omaha. Rural leaders from the east coast, south, and most of the midwestern states were represented at the meetings.

Hamil heard the following views on specific rural electrification issues:

• The biggest issue, on a national basis, involves terrritorial disputes. "Most co-ops wanted to stay in the territories they had served before they were taken away because of annexation to nearby cities"—and placed under the jurisdiction of local municipal systems or franchised power companies. "The most potent issue" facing the rural electrification movement today, finds Hamil, "is the right for co-ops to be allowed to continue to serve the areas developed by them."

• Relations between co-ops and neighboring systems are causing more discussion, Hamil also finds. "Mr (Walter) Harrison (NRECA president) says it's high time to sit down and arbitrate these differences," says Hamil, "instead of the earlier practice of each system going its own way, and letting the sparks fly where they may." Hamil says the co-op leaders tell him that "The success of co-op relations with municipal or private power systems seems to depend almost entirely on the echelon of management that sits down on each side to arbitrate." The quality of co-op-municipal and co-op-company relations is "scattered," says Hamil—no trend either way, and no regional conditions.

• Private financing for co-ops is being mentioned by farmers, and "more of them seem to be interested in it each year. Some systems are trying to finance all their future construction needs from their own revenues already."

• The 2% REA interest rate comes up for discussion frequently, Hamil says, but "the number of co-op directors who seem to be bound to the rigid 2% rate grows less each year. Those who say they would be willing to pay the going rate of interest are growing in number, but they aren't a very vocal group."

• "Giant power" (huge federal or jointly-owned regional generating stations, a nation-wide transmission grid, each separated from the management of local power distributors) "just isn't being discussed at the co-op level," reports Hamil, although "There's considerable support for federal backbone transmission lines from federal power projects. There's a lot of discussion going on over joint use of generating and reserve capacity between co-ops and other utilities, all non-federal."

• The new REA 2% bonds haven't sparked any comment at the meetings, although Hamil notes that a special pro-and-con panel discussion on the subject was scheduled for the Minneapolis meeting of NRECA Region 6 Oct. 31.

• "Most co-ops today seem to be happy with the Rural Electrification Administration," Hamil reports. "Of course," he concludes, "there's never been an REA administrator—whether his name was John Carmody or Dave Hamil—whose views were entirely approved."

Complications on Snake Hearings

Legal maneuverings and postponement request threaten to slow FPC hearings on Nez Perce and High Mountain Sheep

Legal maneuverings, complications and a possible two-month delay faces the controversial Nez Perce-High Mountain Sheep hydropower license case, pending before the Federal Power Commission.

FPC examiner William C. Levy was to rule Friday, Nov. 4, on a motion to postpone the hearings until Jan. 9. His ruling was due at 10 am of the same day the hearings (on cross-examination) were set to begin. In addition to ruling on the motion to postpone, Levy said he also would rule on various motions to strike testimony from the record (EW, Oct. 31, p 49).

The motion to postpone the hearings, filed by attorney Evelyn Cooper for Washington Public Power Supply System (Nez Perce applicants), coincidentally called for the hearings to begin (Jan. 9) on the same day as another highly publicized license battle: Arizona Power Authority vs the City of Los Angeles, for permission to build the huge Bridge Canyon Project on the Colorado River, Ariz.

The WPPSS motion to postpone was based on two points: (1) WPPSS didn't have time to prepare its case adequately for the Nov. 4 hearing because of uncertainty of what testimony would be stricken from the record; (2) Recent agreement on a proposed joint development of the Columbia River by the US and Canada—adding about 1.7 million kw of prime power in the US Pacific Northwest—relieved the pressure on FPC to rush through the Nez Perce-High Mountain Sheep case.

Other highlights of last week's fast-moving legal maneuvers included:

- Denial by Levy of the Nez Perce motion to subpoena two FPC staff members for alleged "bias" and "preconceived conclusions" in favor of the High Mountain Sheep.
- Plans by Nez Perce attorneys to seek a review of Levy's denial by the full Commission.
- The possibility—but not probability—that all testimony on fish and conservation aspects of the huge dam projects might be heard separately in the Pacific Northwest.

Nez Perce attorneys, Cooper and Joseph Sharlitt, said a delay to Jan. 9 was essential for their case because it would be "impossible to determine the nature and scope of the case-in-chief of the other parties" in time for the scheduled hearing date of Nov. 4. Nez Perce applicants, incidentally, are scheduled to make their opening remarks, and carry on their cross examination, after High Mountain Sheep applicants, Pacific Northwest Power.

The two-month delay, also could be used to push the hearings past the presidential elections—when a different administration atmosphere might change the outcome of the case. Recent statements by the Democratic Natural Resources Commmittee criticized various activities of the Federal Power Commission (EW, Oct. 24, p 38), and Sen John Kennedy has named Owen Hurd, WPPSS managing director, to the Advisory Committee.

Levy, denying the Nez Perce motions to subpoena Francis L. Adams, chief of the FPC Bureau of Power, and Lesher S. Wing, regional engineer in the FPC San Francisco office, stated that, "The allegations (of Nez Perce) do not support the charges. . . . The proposed depositions (of Adams and Wing), if permitted to proceed, can only interfere with the commencement and progress of the hearing in the pursuit of unfounded and unsupported charges." Levy added that the Nez Perce applicants "will have every opportunity, independently and in its cross-examination of staff witnesses, to establish the alleged error in the staff's comparison and evaluation of the competing projects and the staff's alleged prejudice and bias. . . . in addition, the request (by Nez Perce) to rummage through the Commission's nonpublic files is procedurally defective and improper."

The Nez Perce plan to seek full Commission review of the examiner's denial is the standard "next step" in the FPC's rules of procedure. And, an adverse ruling by the Commission could lead to an appeal to the courts by Nez Perce. Hearings on the case-in-chief wouldn't need to be suspended during this appeal, however.

FPC staff attorney Donald Sander answered WPPSS motions to strike much of his staff's testimony, replying that Nez Perce charges that the testimony was "unsupported" should properly be taken up, instead, during cross-examination. The Nez Perce objections were against FPC staff engineers Meadowcroft, Froggatt and Lisk.

Pacific Northwest Power answered WPPSS motions to strike much of its testimony on the same ground mentioned by Sander—that the hearing would be the proper place for objection to the testimony under question. PNP attorneys called the Nez Perce motions to strike High Mountain Sheep testimony "frivolous, specious," adding that one motion was "careless or deliberately mischievous."

PNP also hit back at an FPC staff motion to strike, as unqualified, the geological testimony of its witness, Charles Bonin, engineering manager of Ebasco Services, Inc. PNP admitted that "Mr Bonin is not academically trained in the science of geology . . . (but) he has acquired through experience full qualifications to testify concerning the matters that are included in this testimony . . ."

The Oregon State Water Board answered a WPPSS motion to strike some of its testimony on the grounds that the State Board, presenting its views through its secretary, Donel J. Lane, is an official viewpoint, not subject to motions to strike. And the Oregon Public Utilities Commission Chairman, Jonel C. Hill, answered Nez Perce motions to strike its testimony, involving the failure of WPPSS to obtain an Oregon license as irrelevant, on the grounds that the Nez Perce charge of irrelevance is "contemptuous of Washington Public Power Supply System's duty to apply" for such permit, and that such permit is required by FPC regulations.

First Union Contract Signed by Southern Co

Ending a 25-day strike, Southern Electric Generating Co last month signed its first union contract with Local 2077 of the International Brotherhood of Electrical Workers. The union had asked for a 7% wage increase effective May 9, the day negotiations began. SEGCo, a Southern Co affiliate, offered a 4% across-the-board boost July 25. On Aug. 16, SEGCo renewed its 4% offer, to be effective July 22, with modified set of classifications, and set a 30-day deadline for acceptance.

The local struck Sept. 17, after an impasse on wages and working conditions, but voted on Oct. 11 to accept the utility offer. The two-year contract provides an optional reopening on wages in 1961 and annual contracts starting in 1962. It also provides for an open shop, recognition of the employees' collective bargaining rights, and a three-man arbitration board as a final appeals group on grievances.

During the strike, the plant operated at full capacity with supervisory personnel. SEGCo president J. F. Crist expressed the belief that the plant could "operate indefinitely with our supervisory personnel."

Neutron Gun Interests Fair Visitors

Neutron gun which starts display of nuclear fission lures visitors of all ages at the New York State Fair in Syracuse. The display, sponsored by seven investor-owned utilities in the state and covering 1,600 sq ft, gave Fair visitors a chance to see a 230-kv breaker in operation; examine models of Indian Point Atomic Plant and the HTRDA project; play a "Live Better . . . Electrically" game; and learn the facts of investor-owned utility operation. Attendance hit 151,000, about 30% of the total attendance at the Fair.

SWPA Accounting Changes Ordered by GAO

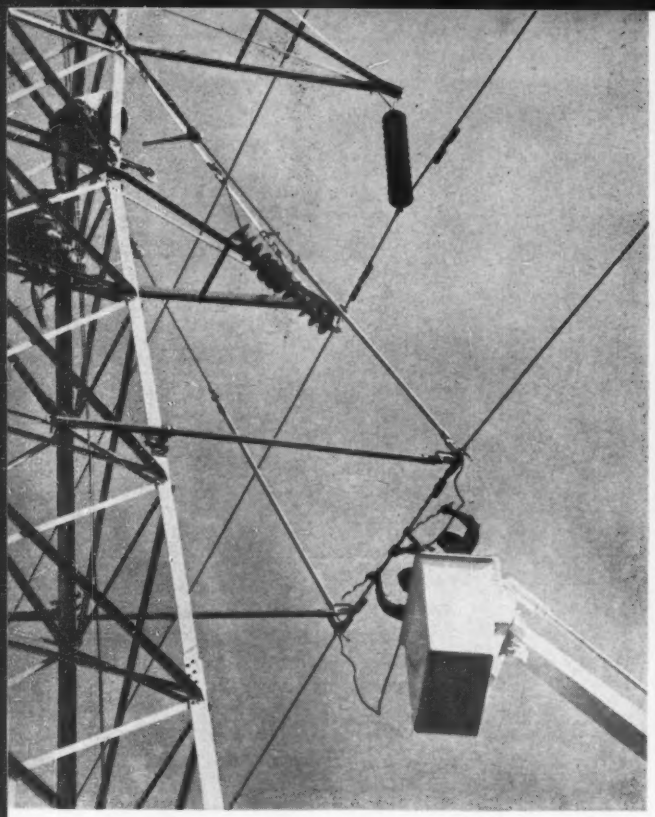
The General Accounting Office has called for the Southwestern Power Administration, and related Corps of Engineers activities in the SWPA area, to make several adjustments in their annual reports to the federal government. They principally involve interest on federal investment, amortization of land and land right costs, and repayments on the federal government's investment.

The GAO report to Congress, a comparatively mild one, commended SWPA for making other accounting revisions in the past few years, but specifically criticized the following:

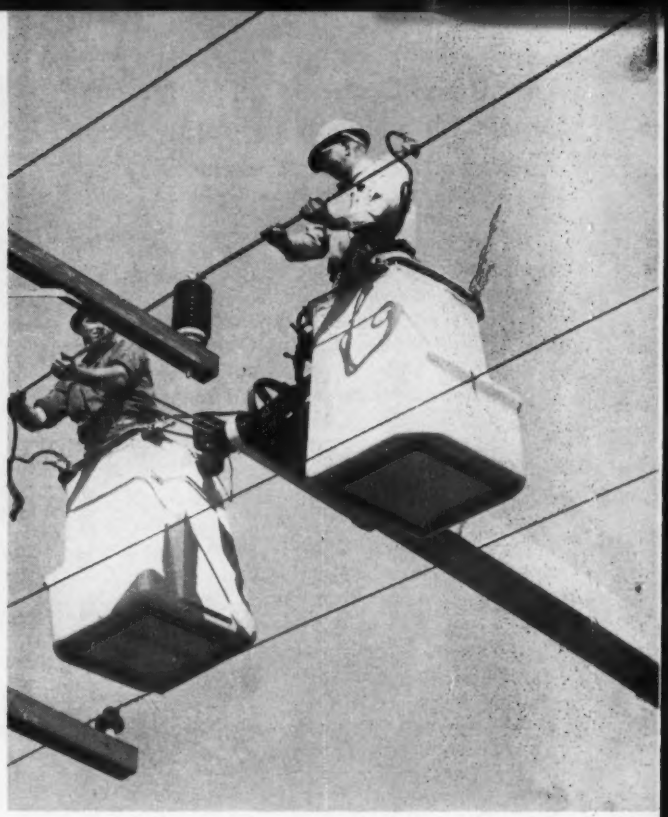
(1) "A need for the Southwestern Power Administration to amortize the costs of land and land rights, clearing land and rights-of-way, and roads and trails. In many instances, these costs represent a substantial portion of the construction cost of a project, and lack of a provision for amortization can have a significant effect on the disclosure of financial results of the projects operations.

(2) "Interest on federal investment in the power program is significantly overstated because SWPA power revenues have not been considered in making interest computations. SWPA power revenues have not been considered by either the Corps or SWPA in making interest computations. As a result, interest on the federal investment in the power program has been significantly overstated. (Corps overstated about $6,430,000; and SWPA $1,170,000; a total of $7,600,000 through June 30, 1959.)"

(3) "Financial and statistical data on reimbursable operations issued by the Corps and SWPA did not relate the actual repayment of the federal government to any scheduled repayment or projected return within the established 50-year project repayment period. SWPA's repayment schedules show that fiscal year 1959 power revenues were $3,626,551 less than scheduled repayment requirements. The cumulative repayment deficiency of the system at June 30, 1959, was shown to be $26,507,661. The Administrative Assistant Secretary of the Interior stated that approximately five additional years of integrated system operations would be required to repay this deficiency. We (GAO) do not question the Department's administrative decision regarding the repayment period; however, we believe that the repayment scheduled should show clearly the actual status of, and proposed plans for repayment of the government's interest."

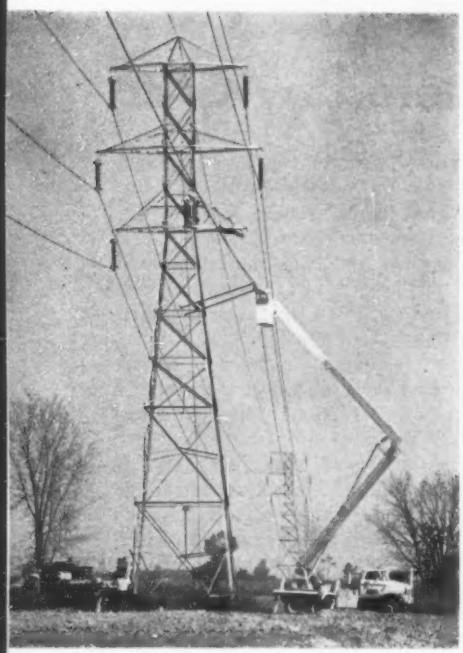


Working 138-kv . . .



and 34.5-kv with bare hands

New Technique Eliminates Gloves



LIFT BUCKET is key to operation which equalizes voltage in line and men

A new technique for working lines up to 380-kv without gloves or other rubber protection is making American Electric Power System linemen the "hottest" in the utility business. Charged up to voltages like these, the linemen can work with the same safety—and nonchalance—as a bird perched on a high voltage line, provided they have the proper training and equipment.

Here's how it works. Supported by an insulated aerial boom, the linemen work in a fiberglass bucket lined with metal mesh that is connected by clamps to the hot line they are servicing. Since the men are at the same voltage as the conductor, although physically unaware of it, no current flows through them.

The newly adopted method has many important economic advantages. Reporting the new techniques, Philip Sporn, president of AEP, enumerated:

- Further improvement of service reliability by eliminating interruptions for line repairs.
- Reduced line maintenance costs due to savings in time and manpower.
- Simplified working conditions, permitting men to work without cumbersome tools and equipment.
- Greater safety in many cases than with the conventional practice.

As an example of savings in time, AEP reports that under ideal conditions the conventional method of changing an insulator on a 34.5-kv wood pole line would take about five manhours. With the new technique, it can be done in half a manhour.

The method has been thoroughly lab-tested at up to 380 kv and proven safe in field tests with hot 138 and 34.5 kv lines in the Ohio Power Co's service area. The new method is already in use on some parts of the AEP system and will be extended as availability of properly trained men and equipment permits.

The basic idea was developed by H. L. Rorden, AEP high voltage practices engineer, who also supervised the research and testing. The lab tests were carried out in the high voltage laboratory of Ohio Brass Co.

Dateline . . . Hanford, Wash. (*Continued from page 5*)

and allowance for insurance, taxes and other private enterprise type financing costs.

The Beck report reviewed three other studies on the addition of power facilities to NPR. They were: General Electric Co report of March 1, 1958 (basis of an AEC report to JCAE upon which NPR was authorized); Stone & Webster report of Dec. 30, 1958, to AEC that convertibility was definitely not economically feasible; and a Federal Power Commission report of Feb., 1960, also requested by AEC, which concluded that NPR convertibility would be economic only on the basis of forecast decreasing fuel costs for a 636-Mw dual-purpose reactor.

The GE report, according to Beck, was sound in its recommendation to install generation. But changes to reflect higher values for NPR energy were recommended. The Stone & Webster report, in Beck's summation, should be considered as an incomplete, preliminary report relating to a general approach to the evaluation problem.

"The NPR generating reserves and costs thereof used by Stone & Webster appear to be unrealistic and to penalize the NPR power production program when compared to the treatment given to conventional steam plants," Beck said.

FPC's report—completion of which delayed the Beck findings—came too late for JCAE to consider including NPR generating facilities in this year's authorization bill for AEC. FPC's report, however, contained all the "essential basic data necessary for a realistic and up-to-date appraisal of the economic factors incident to the federal government adding power production facilities to NPR," the Beck report said. Had FPC used net cost of nuclear fuel at government cost (including crediting to Pu production the profit component of the government "price" of uranium which the government "sells" to itself) instead of forecast nuclear fuel costs, however, Beck said additional reactor cases would have been found economically attractive.

With offices in Columbus, Neb., and Seattle, Beck has a previous work history in public power projects. The determination to install generating facilities, consistently found by Beck to be feasible over a wide range of cases, stemmed from certain key differences between Beck's beginning premises and the FPC's. Beck used longer Pu production periods (10, 15 and 20 years) over the reactor's 35-year lifetime than did FPC. Also used were higher alternative power figures (basis for establishing NPR energy market value), higher plant capacity figures, and lesser NPR back-up power costs.

Whether or not Congress will vote the next and final step to complete the JCAE-sponsored dual-purpose design in the next session remains to be seen. If JCAE were to put across an authorization ($101-122 million) for turbine-generators Congress would still have to appropriate funds under AEC appropriations bill for fiscal 1962.

There is little doubt that federal construction of a steam electric generating facility in the northwest will add fuel to the running fight over investor-owned vs public power in the area. Full scale blood-letting which could break out during the Congressional proceedings largely depends upon:

1. AEC's latest position on the matter (favorable when convertibility of the reactor was authorized in 1958, under the chairmanship of Lewis Strauss);

2. Attitude of private utilities operating in the Columbia River area (tentatively indicated as being agreeable if economic integration into the Bonneville system can be demonstrated);

3. Disposition of NPR power with respect to preference clause sales.

The investor-owned vs public fight over the $25-million extra costs for power-type zirconium tubing and other convertible features of NPR for power operation was successfully averted by Sen Clinton P. Anderson (D-N. M.) during initial authorization proceedings. In answer to the objection of Sen L. P. Saltonstall (R-Mass.)—during the floor debate in the fiscal 1959 AEC authorization bill—that NPR electricity should instead be procured from private firms, Anderson convinced Saltonstall that by-product electricity coming from NPR would materially reduce government production costs of Pu.

Private utilities—because of rapid-mounting energy requirements in the Pacific Northwest—have been advised by Bonneville that after 1964 they may be cut off from purchases of federally-produced Columbia River power. Under preference clauses, BPA power must first be sold to public power groups. NPR power would therefore postpone the day when private groups lose BPA power.

Anderson, for the record, pledged that so long as he was in Congress, he would not support preference clause restrictions on the sale of NPR power: "I hope we will put such restriction on the power that it will not become public power in the ordinary sense of being subject to a preference clause for the sale of power to cooperatives. It need not be and it should not be."

Officials of private utilities, now assessing chances for generating facilities installation, believe the entire matter hinges on how close Anderson abides by his previous position on the preference clause.

511-Home Bird Key Has 120/240-V

Developer buys safety, service, beauty for luxury residential enterprise, including yacht club and marina

BIRD KEY as seen from air last January shows original portion of land above water, some 35 acres, before 3.5 million yd of embankment had been dredged

DEVELOPMENT WORK produced a different picture by June after some 217 acres had been added to the key. City of Sarasota lies in background

Bird Key, 511-homesite community in Sarasota, Fla., has the hallmark of luxurious living, an underground 120/240-v 3-phase system consisting of 33 transformer vaults and 55 miles of cable encased in concrete.

In deciding to spend $876,000 of the total development's $4-million outlay, the developer, Arvida Corp, purchased the many benefits of an underground system, especially its safety, service, and beauty. Hurricane Donna's recent visit left the distribution intact, and caused no complaints of power failure.

The Bird Key electrical system has been transferred to Florida Power & Light Co for operation under a guarantee bond in which the realty company agrees to pay the cost of all repairs attributable to the initial construction. This bond will be in effect for one year.

Project Second Such

This was also the procedure followed by the builder and utility in turning over the Royal Palm Yacht and Country Club at Boca Raton last May. The latter project's electrical system for 742 homesites, along with a yacht club, yacht basin, and country club, cost $1,250,000.

The Bird Key electrical system is looped between two independent primary connections to Florida P&L lines. Demand for the 511 homes and yacht club is expected not to exceed 3,250 kw on a system capable of supplying 5,000 kw. The system is designed for a total peak, including heating and air conditioning, of 19 kw at each home. Diversity is expected to cut these noncoincidental peaks to 10 kw per home at the transformers.

The loop system is arranged so that any vault, or the cable between two vaults, can be isolated by moving load-break oil switches. As the entire subdivision can be fed from

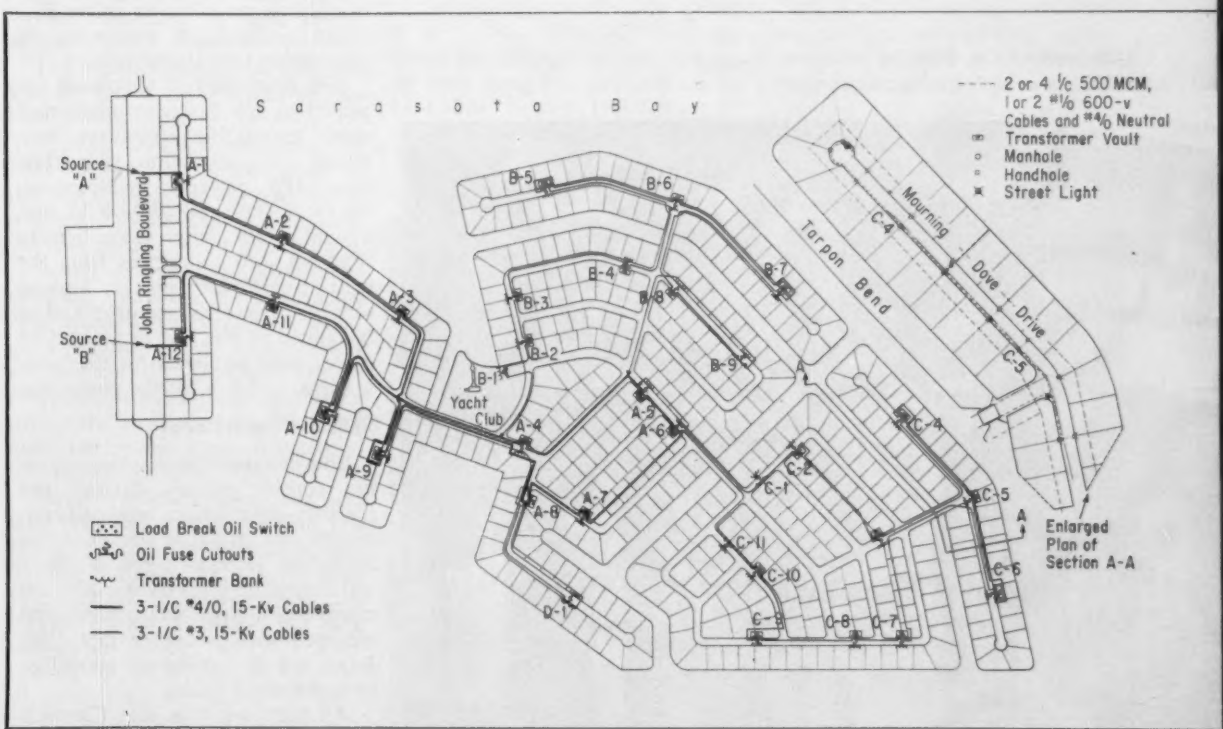
3-Phase Underground Distribution

either of two points on the Florida P&L overhead distribution system, each transformer vault has two power sources.

Vaults are of two types, one 6 x 14 ft; the other 6x16 ft. Maximum rating of transformers for the first type vault is one 167-kva lighting unit and a 50-kva teaser. The other vaults can hold three transformers of any rating up to 167 kva.

Underground vaults are in the street right-of-way, and are closed by tops which can be removed to allow enough space for lowering a transformer. A 2-ft panel at each

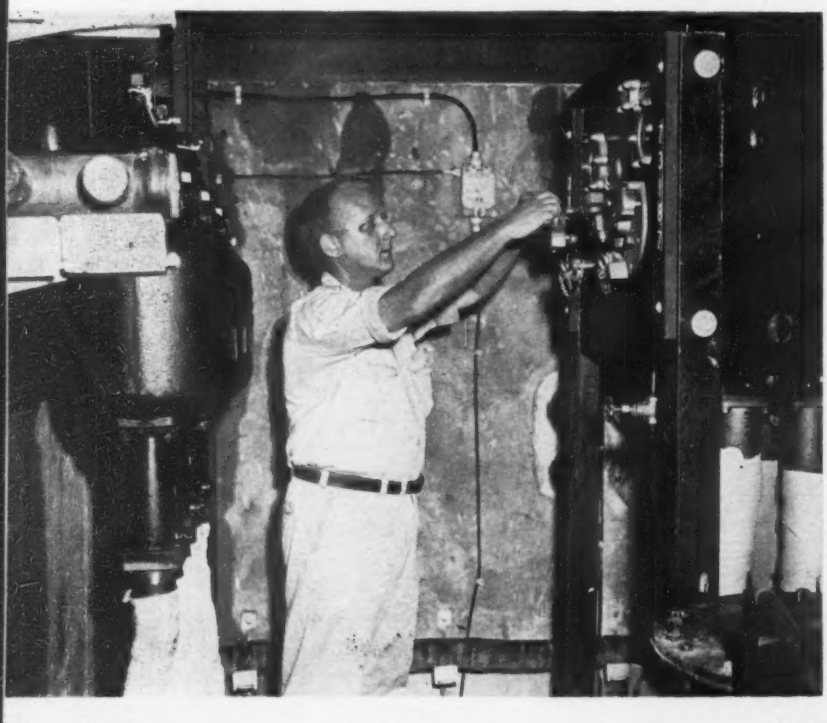
COMPLETED HOMES are the luxury type suited to Florida climate. Electrical service to one home can be seen at right center. Lots cost up to $32,000



SINGLE-LINE DIAGRAM shows location of primaries and manholes with transformers for bringing electric power to the 511 homes and yacht club. Larger scale section illustrates secondary and street lighting layout

DUCTWORK winds away from a concrete handhole through Bird Key as dragline digs trench ahead to make way for the line's continuation

LOAD-BREAK OIL SWITCH in vault is checked by Florida P&L electrician. The utility company is taking over completed system



end of the top's center precast-concrete slab is grating for natural convection cooling.

Oil fuse cutouts on the primary side afford overload protection for each transformer, but there are no overload devices on the secondary system. Transformers have lightning protection from arresters at each of the two terminal poles.

As the transformers are the subway type, all enclosures and connections inside the vaults are watertight to provide a completely submersible system. Each vault has a sump pump. As Bird Key is in Sarasota Bay, all steel framing and ladders in vaults have been hot-dip galvanized after completion of drilling, welding, and forming. This was done to prevent corrosion.

Single Conductors Used

As already constructed, primaries in the system's main loop are three single-conductor, No. 4/0, 15-kv PILC cable in ducts. Subloops are three single-conductor, No. 3 cables. The conductor is copper, insulated with paper, protected by a lead sheath covered with Neoprene. This cable was selected because, with proper cathodic protection, it requires less maintenance under Floridian conditions, as was proved by local utility companies' tests.

The economies of aluminum appealed to the designers when they were considering secondary conductor. Its insulation is rubber, type RHW, protected by Neoprene. No. 4/0, 350 and 500-MCM aluminum cables comprise the lighting legs; No. 1/0 conductors from the teaser transformers provide 3-phase service. Where voltage drop had to be limited to 3%, 350 or 500-MCM cables were paralleled for the lighting legs, and 1/0 for the power leg.

Splices Conventional

Conventional splices were used on the copper primary cables, and specially-designed pre-insulated connectors and insulating sleeves on the aluminum secondary system. Neutral conductor joints were made with compression-type connectors and wrapped with Neoprene tape. All joints are in handholes, manholes, or transformer vaults.

All ducts are 4 in. dia. Concrete encased fiber ducts were laid in the street to give the cable system protection from the weight of traffic.

Transite conduit carries rear-lot lines. In primary and secondary duct banks, one spare duct is provided, and there are two spares where primary and secondary circuits are combined in the same bank.

The cable is protected by connection of the cable sheath and lightning arresters to a low-resistance ground at each terminal pole. The latter ground is isolated from the neutral-system ground which keeps the conductor and lead sheath at the same potential level during lightning surges.

Cathodic protection for the high-voltage cable sheath was effected by isolating the sheath where the cable enters the load-break oil switch. In each vault and manhole, a separate, isolated ground is provided for the cable sheath and system neutral. A zinc anode placed under each vault and manhole is connected to the cable sheath. All equipment enclosures inside the vaults are connected to the system neutral ground.

Each lot has a 120/240-v, 3-phase, four-wire service from an open delta transformer bank. Service lines to the house are installed by the individual home builder, but the actual connections to the pre-insulated connectors are made by the utility.

The transformer vaults and the primary cables are of a size to provide 10-kw capacity for each lot. The utility installs transformers of sizes needed to serve the loads as the area continues to develop. More secondary cables can be placed in the duct bank to meet load growth.

Streets are lighted by 55 custom-designed, stainless steel lanterns, each encompassing a 200-w incandescent-lamp socket. Luminaires are controlled individually by a photoelectric cell built as an integral part of it. Lanterns on 8-ft tapered aluminum poles are connected to the nearest secondary service.

Ultimate development of Bird Key, including the value of land, improvements, and completed homes, has been estimated to be worth more than $25-million. Development, begun in October, 1959, has just been completed.

WORKMEN set concrete handhole in place in Bird Key's underground electrical system. Such manholes contain connections for circuits branching to homes

Bird Key homesites are priced from $9,000 to $32,000. The anticipated maximum electrical demand for each home was estimated to be 19 kw for lighting and heating or air conditioning.

All Bird Key recreational facilities, except the electrical system, have been deeded to club members. These facilities include a yacht club, a marina for 62 boats, a swimming pool, and a tennis court.

SECONDARY JOINTS have Al-Cu adapters screwed into insulated buses

Static Equipment Provides Impulse

C. J. SNYDER, Meter Engineering Dept, Westinghouse Electric Corp, Raleigh, N. C.

New high rate impulse devices have been made available to meet the need for smaller demand increments and higher accuracy for metering large power customers. The system depends upon the static impulse totalizing relay employing transistorized units. This device accepts impulses from several metering circuits, separates simultaneous impulses, and transmits the total number received on a single output channel to the indicating or recording demand receiver.

The totalizing relay is housed in a draw-out switchboard relay case and can be furnished with input circuits for as many as seven impulse sources. It has only one moving part, a plug-in output relay, that requires any maintenance beyond routine inspection.

Operation of the static impulse totalizer depends upon the premise that impulses from a watthour meter will not exceed a readily predictable maximum rate, established by the highest possible load and the ratio of meter revolutions per impulse determined by the contact device specifications.

Utilizing printed circuit board construction, each unit has a power supply and output relay chassis, a pulse generator or "clock" board, an output board, and from three to seven input channel boards.

Each input channel board contains three circuit sections which perform the functions of input, storage, and interrogation. Upon receiving alternate contact closures from each side of a 3-wire contact device in the watt-hour meter, the input section delivers a pulse to the storage section and causes it to be placed in a "set" or "stored" condition.

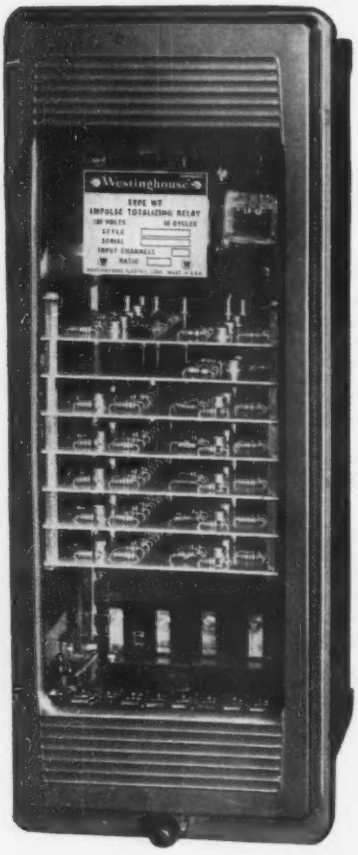
Continuously Scans Stored Pulses

The storage sections are continuously interrogated or "scanned" in sequence by the interrogation sections, at a rate established by the clock board. When a "set" storage circuit is interrogated, an impulse is delivered to the output board and the section is reset to receive a new pulse. The output circuit board furnishes power to drive the output relay and also provides for input/output impulse ratios of 1:1, 2:1, or 4:1.

On standard 1:1 ratio totalizers the storage sections are interrogated at 16-cycle intervals, counted off from the 60-cps supply by the clock board. For example, in a five-channel 1:1 ratio unit all input channel storage sections would be scanned and cleared of stored impulses every 80 cycles. Because the storage section for each input will store only one pulse, it is apparent that the input rate must not exceed one impulse every 80 cycles, or 45 impulses per min, if all are to be retransmitted without loss.

This limitation on input pulse rates is generally of only academic interest as 45 impulses per min from each of the five inputs would result in a total of 3,375 demand impulses in a 15-min demand interval. This figure greatly exceeds the capacity of present demand receivers.

The transistor circuits are capable



STATIC impulse totalizing relay is housed in switchboard case

IMPULSE SENDING device imposes little friction load on kwhr meter

of totalizing impulses at much higher rates, but the output rate of the totalizing relay has been intentionally limited to 225 impulses per min to make operation compatible with existing demand recorders. When higher speed recorders become available, a change of two leads will raise the output rate to either 450 or 900 impulses per min and increase permissible input rates accordingly.

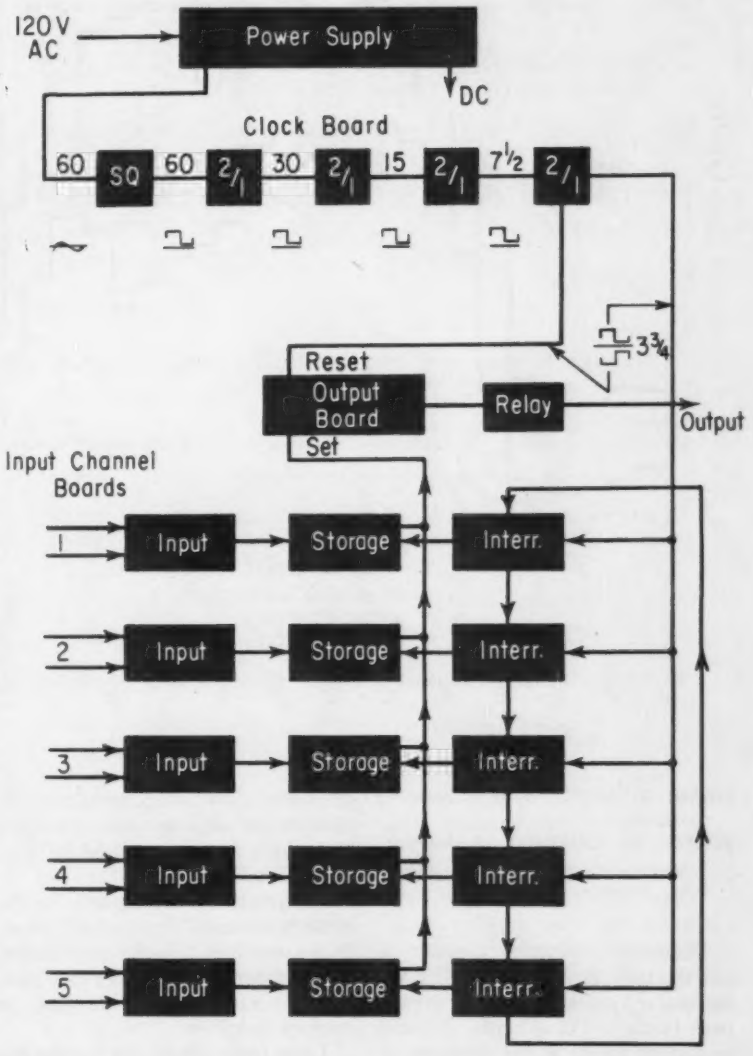
Sender Driven by Meter Shaft

A companion unit for such high-rate impulse systems consists of an impulse sending device that imposes no appreciable friction load on the watt-hour meter. This electronic impulse sender consists of a pick-up head containing a transistorized, high-frequency oscillator mounted in the meter; a rotating, segmented vane driven by gearing from the meter disc; and an externally located power and relay unit.

As the vane rotates, the solid sections are interposed between the oscillator coils, reducing mutual coupling between them and causing the circuit to change from an oscillating to a non-oscillating state. This change, and a reciprocal change as the circuit again goes into oscillation when a cut-out portion of the vane appears between the coils, causes operation of an output relay with 3-wire (SPDT) contacts.

The 3-wire output contacts make the impulse unit suitable for replacement installations in existing systems as well as for new installations where rates up to 500 impulses per min may be desired.

Occasionally, the need arises to store impulses temporarily and release the transmission channel to some higher priority function. To meet this requirement, an improved mechanical impulse storage relay has been developed which is capable of receiving impulses at rates up to 500 per min. A recently-developed stepping motor acts as the impulse-driven actuating element. Provision is made for storing up to 500 impulses. These impulses are retransmitted at the rate of 45 impulses per min so as not to exceed the maximum continuous input rate of some existing demand receivers.



INPUT CHANNEL BOARD contains three sections which perform the functions of input, storage and interrogation at a rate established by the clock board

In addition to totalizing several impulse sources, it is occasionally necessary to subtract impulses of a minor load from those of a larger one to obtain a net demand. This may be accomplished by a new impulse difference relay capable of accepting 500 impulses per min at either the positive or negative inputs.

The unit features two stepping motors geared to opposing sides of a precision differential. The differential output shaft drives a ratcheted cam and contact system to retransmit positive impulses less those neutralized by subtractive impulses from the minor load. A storage capacity of 30 impulses is provided for brief periods when negative impulses received may temporarily exceed incoming positive impulses.

What Price Peaking Capacity?

Economics favor large steam units with modifications for large systems that permit efficient operation at low load

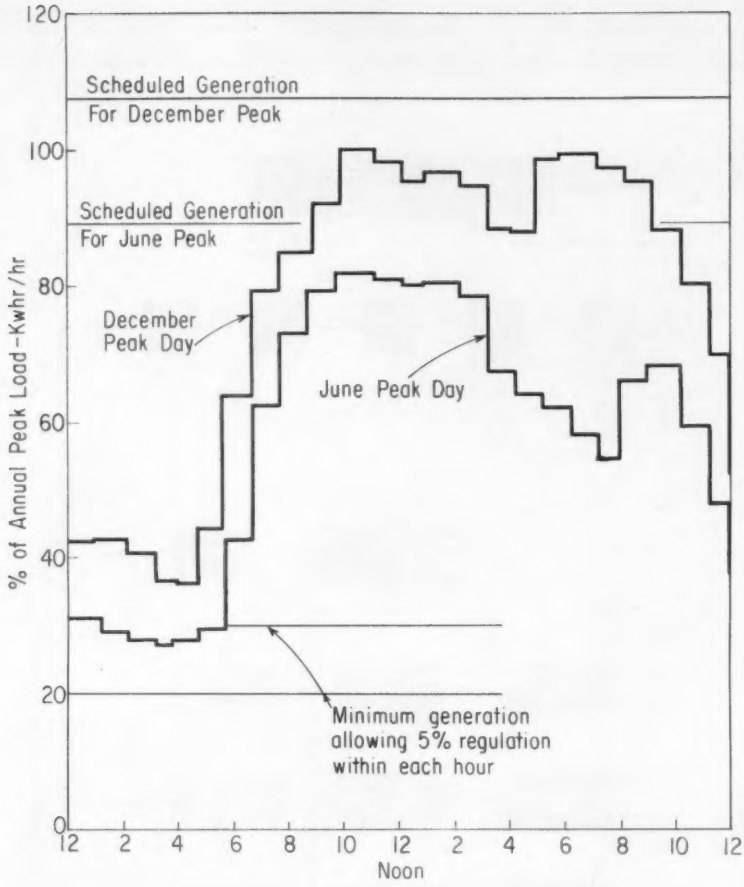


FIG 1—TYPICAL DAILY LOAD CURVES for summer and winter emphasize contrast between peak and minimum loads

OWEN A. LENTZ, System Planning Engineer,
ROBERT D. CAMBURN, Professional Engineer, Commonwealth Associates, Jackson, Mich.

Economical peaking capacity is not the only problem posed by the increasing spread between system peak loads and base loads. Equally important today is the problem of operating large, high-pressure high-temperature units at relatively light loads—20 to 25% of rating.

A comprehensive analysis of these problems points to the following conclusions:

1. There is little economic incentive today for installing peaking units on the larger utility systems, although peaking generation may have a place on smaller systems.

2. Installation of large, high-efficiency steam turbine generators is still the most effective way to achieve lowest cost electric power.

3. Since a combination of base load and peaking units does not presently appear economically attractive on large systems, it follows that the alternative should be pursued. That is . . .

4. Greater effort should be directed toward developing large, high-pressure, high-temperature steam generators, turbines and electric generators better adapted to cycling operation.

Long range objectives for the design of such large steam turbine generators should be:

- The ability to generate economically and dependably for extended periods at 20-25% of rating, recognizing acceptable plant and system operating practices.
- The ability to stop and start rapidly and frequently without undue maintenance or fuel costs.

If these objectives can be attained it appears that the large size, high-pressure, high-temperature, steam turbine generator will be the most economical and satisfactory fossil fueled generation for larger systems.

Current interest in the economics of low-investment, high-operating-cost capacity, relative to other available types of generation, stems from the fact that most electric utilities do not foresee appreciable improvement in system load factor and that steam turbine-generators appear to be approaching a point of diminishing gain in operating efficiency. The prospect of future systems composed of high-cost generating units of nearly uniform efficiency naturally leads to a question as to whether a combination of base load and peaking units might not yield lower cost electricity.

Recent inflationary trends would also indicate that, in the future, some degree of emphasis will shift from operating efficiency to investment reduction. Equipment and labor costs since World War II have risen at a greater rate than fuel costs. They will tend to assume even greater importance if this trend continues.

These economic considerations have tended to obscure the related

Table 1–Comparative Investments, Dollars per Kw

	"Base Load" Steam Units			"Peaking" Steam Units			Gas Turbines	Package Diesels
Nominal Unit Size	75 Mw	150 Mw	250 Mw	75 Mw	150 Mw	250 Mw	20 Mw	2 Mw
Generating Plant	$216.00	154.00	137.00	166.00	134.00	126.00	126.00	91.00
Plant Substation	17.50	10.00	6.50	17.00	9.50	6.50	9.00	14.50
Transmission Lines & Terminals	15.50	14.00	14.00	12.00	11.50	11.50	0	0
Step-Down Transformer Capacity	6.50	6.50	6.50	6.50	6.50	6.50	0	0
Reactive Supply	5.50	5.50	5.50	5.50	5.50	5.50	0	2.00
Capacity Charge for Losses	5.50	3.00	2.50	7.00	4.50	4.00	0	0
System Total	$266.50	193.00	172.00	214.00	171.50	160.00	135.00	107.50

Table 2–Comparative Annual Costs, Dollars per Kw per Year

	"Base Load" Steam Units			"Peaking" Steam Units			Gas Turbines	Package Diesels
Nominal Unit Size	75 Mw	150 Mw	250 Mw	75 Mw	150 Mw	250 Mw	20 Mw	2 Mw
Fixed Charges	$40.00	29.00	25.80	32.10	25.70	24.00	20.30	19.40
Fuel—Alternate Units Considered	16.50	15.80	15.00	5.00	5.50	5.40	4.80	14.30
Existing Units	0	0	0	12.30	12.30	12.30	17.40	13.40
Banking & Start-Stop	.60	.60	.60	.60	.60	.60	.10	.10
Maintenance	1.20	1.10	1.00	1.40	1.40	1.40	3.10	6.30
Manning	2.50	1.20	.80	1.70	.80	.50	.50	0
Energy Charge for Losses	.20	.20	.20	.20	.20	.20	.10	0
System Total	$61.00	47.90	43.40	53.80	46.50	44.40	46.30	53.50

problem of making modern high-pressure, high temperature steam generators, turbines and electric generators more adaptable to daily load cycles. Recent designs have produced units which operate best at a continuous output between 50 and 100% of rating. But little attention has been given to making steam units that are more capable of operating for extended periods at low output or are more able to stand frequent cycling without undue maintenance.

In the past, reliance upon older generating units to absorb most of the load cycling has allowed the larger, more modern units to generate in their best operating range.

On a future system where high-pressure, high-temperature units predominate there will be need for steam generators and turbines which can dependably operate down to 20 to 25% of rated capability. This

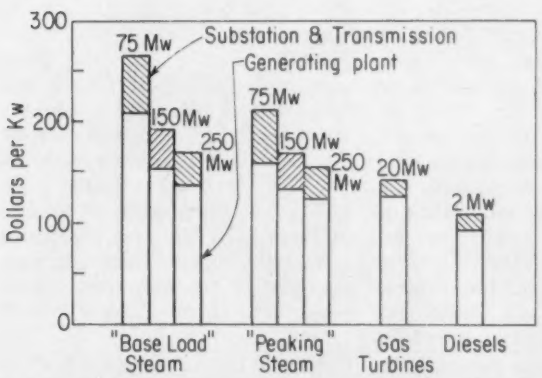


FIG 2—**INVESTMENT COSTS** are less for low efficiency units and cost per kilowatt varies with unit size

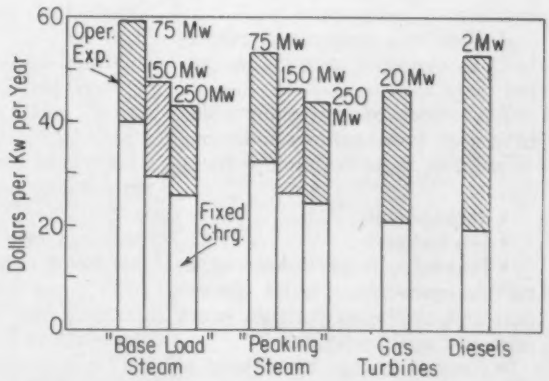


FIG 3—**ANNUAL COSTS** are least for large size base load units with peaking steam units close second

value is arrived at by analysis of system daily load cycles and competing types of generation during minimum load hours.

Fig 1 shows two daily load curves and indicates the magnitude of generation required for the peak hour. This capacity must then be capable of operating while sharing the minimum load. The portion of the minimum load assigned to the base load units may be further reduced by run-of-the-river hydro generation, units operated on the basis of area protection or voltage control and present or future nuclear generation.

Nuclear generation as now visualized is typically base load capacity and will assume a larger share of the minimum load than experienced to date by other types of generation. System load curves are usually expressed in terms of kwhr per hr, thus additional allowances must be made for load trend and regulation within the hour to determine the minimum momentary load that will be experienced by generating units.

Cites Ideal Features for Units

The problem, then, appears to be: "Should high pressure-high temperature units be made more adaptable to cycling or should peaking generation be installed to most satisfactorily solve the peak problem?" The characteristics that may ideally be desired of units designed for peaking service include:

1. Low investment, sacrificing efficiency as necessary to achieve this.

2. Physical durability under frequent load cycling or start-stop operation.

3. Ready availability without undue operating costs, i.e., fast starting and stopping or low fuel consumption in hot standby status.

4. Fast load pickup and adaptability to operation over a wide output range.

Four types of generation which have been proposed to achieve one or more of these desirable features are:

- Package diesel units.
- Gas turbines.
- Peaking or stripped-down steam turbine-generators, usually non-reheat and employing medium steam pressures and temperatures.
- Pumped storage hydro generation.

Considering the extent to which these various types of prime movers meet the requirements of peaking generation, we find that each has some of the desired characteristics.

Gas turbines and package diesels offer low investment although they entail a relatively high fuel cost in most regions of the US. They are fast starting and stopping compared to steam generation. Both can be brought to full load from spinning status in a matter of seconds and the gas turbine can operate for extended periods at essentially zero output.

Non-reheat, medium pressure-temperature steam units also offer some reduction in investment and incur a sacrifice in efficiency by comparison with the higher pressure-temperature reheat units. However, using presently available equipment, it does not appear that they offer much improvement in cycling ability over the typical base load unit.

Pumped storage hydro generation, although meeting most of the ideal requirements of peaking capacity, is rather limited in its application. The investment required for such an installation is highly variable depending upon local availability of water and a suitable storage basin. It can offer a double advantage in that it not only shaves the peak but also fills in the valleys of the daily load cycle. Because of its dependence on local topography, it is difficult to make a general appraisal of pumped storage hydro generation.

Reduced Investment Seen

The economic comparisons are summarized in Fig 2 showing comparative investments for various types and sizes of base load and peaking generating units. These investments, as detailed in Table 1, include the cost of the generating plant and its associated substation and transmission costs. Here it may be noted that investment can be reduced appreciably by installing peaking generation. By comparison with typical base load units, equal size stripped-down steam units can save $12 to $52 per kw. Gas turbines can save up to $131 per kw and package diesels even more, up to $159 per kw, over the smallest size base load unit considered. As compared to a 250-Mw base load unit, gas turbines and package diesels save $37 and $65 investment per kw respectively.

An economic comparison of annual costs of peaking generation and base load generation must generally be made on the basis that the amount of peaking capacity installed will equal the optimum size generating unit addition. Installation of a smaller amount leads to a comparison of the average cost per kw of the peaking generation with the incremental cost of a steam unit. This immediately eliminates or reduces the investment advantage of peaking generation. In addition, it is usually the case that minor amounts of peaking generation would not significantly alleviate the light load and cycling problems with respect to other system generation.

Peaking Units Operate Longer

The most important factors in evaluating operating expenses are the required operating hours, efficiency and fuel cost for the peaking generation. To determine operating hours, the daily peak load and probable generation scheduling should be analyzed for a typical year taking into account scheduled maintenance outages, spinning reserve requirements and generation additions within the year. Further study of the daily load cycle must be made to determine the required hours of operation per day, making allowance for start-up and shutdown lead and lag time.

Our studies indicate that for a typical system carrying 12-15% reserve capacity, gas turbines or package diesel peaking capacity in an amount equal to the optimum size unit addition (assumed equal to 10% of the total system capacity) will operate 1,200 to 1,600 hours per year. Peaking steam units would generally operate an appreciably larger number of hours due to longer start-stop lead and lag times.

Utilizing these operating hours and assuming fuel costs of 30¢/million Btu for coal, 60¢/million Btu for gas and 90¢/million Btu for oil, the comparative annual costs in $/kw/yr are shown in the bar graph of Fig 3. These costs, as detailed in Table 2, include fixed charges on investment, system fuel expenses, maintenance expenses, manning expenses and energy charges for I^2R losses.

Data in Fig 3 indicates that where 150-Mw or 250-Mw base load type units are optimum size system addi-

(*Continued on page* 124)

EASY FIELD ADJUSTMENTS WITH FINGERTIP CONTROL

Just move a pin and turn a wheel—that's all that's necessary to change the operating sequence of General Electric automatic reclosers. Both the number and timing of instant and time-delay trips can be adjusted quickly in the field to meet your distribution needs.

As a result, General Electric hydraulic reclosers (5 to 280 amps) can be coordinated with other types of reclosers you now may have on your distribution system.

OTHER BENEFITS

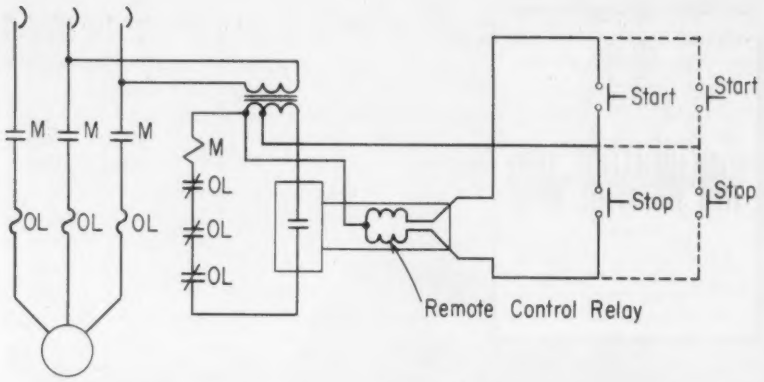
Besides being easy to adjust, G-E reclosers are:

- **Sealed against moisture and impurities.** Oil contamination is virtually eliminated by a Nitrile rubber gasket and three-way clamp which provides a constant seal around the entire top of the recloser tank.
- **Designed for longer operating life.** Rolling contacts break quickly with a minimum of wear.
- **Protected by a three-year warranty on materials and workmanship.** As a result, you're assured of superior recloser performance when you buy from General Electric.

Ask your General Electric Sales Engineer for more information on how G-E reclosers can provide your distribution system with flexible, trouble-free protection against outages caused by temporary or transient short circuits. Or, send to Section 493-02, General Electric Company, Schenectady 5, N. Y., for Bulletin GEA-7023.

Progress Is Our Most Important Product

GENERAL ELECTRIC



DESIRED FEATURES of 3 and 2-wire control schemes are combined to incorporate the operation of a latching contactor without large auxiliary devices

LV Relay Key to Economical Parallel Control

GLEN C. SCHEUFELE, Project Engineer, Black & Veatch, Kansas City, Missouri

Flexibility of parallel control of motor starters in power plants can be obtained economically through the use of low-voltage remote-control relays. These relays are the key to a control scheme that combines the desirable features of the standard three-wire and two-wire starter control methods. Such a control scheme was installed in the new Alexandria, La., steam electric generating station. According to D. G. Hunter, meter supervisor, the scheme has provided four years of trouble-free service.

Parallel control of motor starters permits starting or stopping from any of several stations, such as at the local motor control station or at the centralized control panel. The standard three-wire control scheme permits this type of operation. However, one of its main disadvantages is that during even a momentary power interruption all starters drop out and will not reclose automatically upon restoration of voltage.

On the other hand, the standard two-wire maintained-contact control scheme will keep the starter coil energized as long as adequate voltage appears at the source. This two-wire control scheme, however, cannot be adapted to parallel control. With this scheme a motor may be stopped from any of several locations or it may be started from the same ones; but it cannot be started from one and stopped from another.

The desirable features of both these schemes may be combined if latching contactors are used to operate the controlled device either directly or through a starter operating coil. But the latching contactor costs about as much as some smaller starters and usually requires either a separate or a larger starter enclosure than otherwise would be required. For grouped controls, such as in a motor control center, separate sections containing only latching contactors may be required.

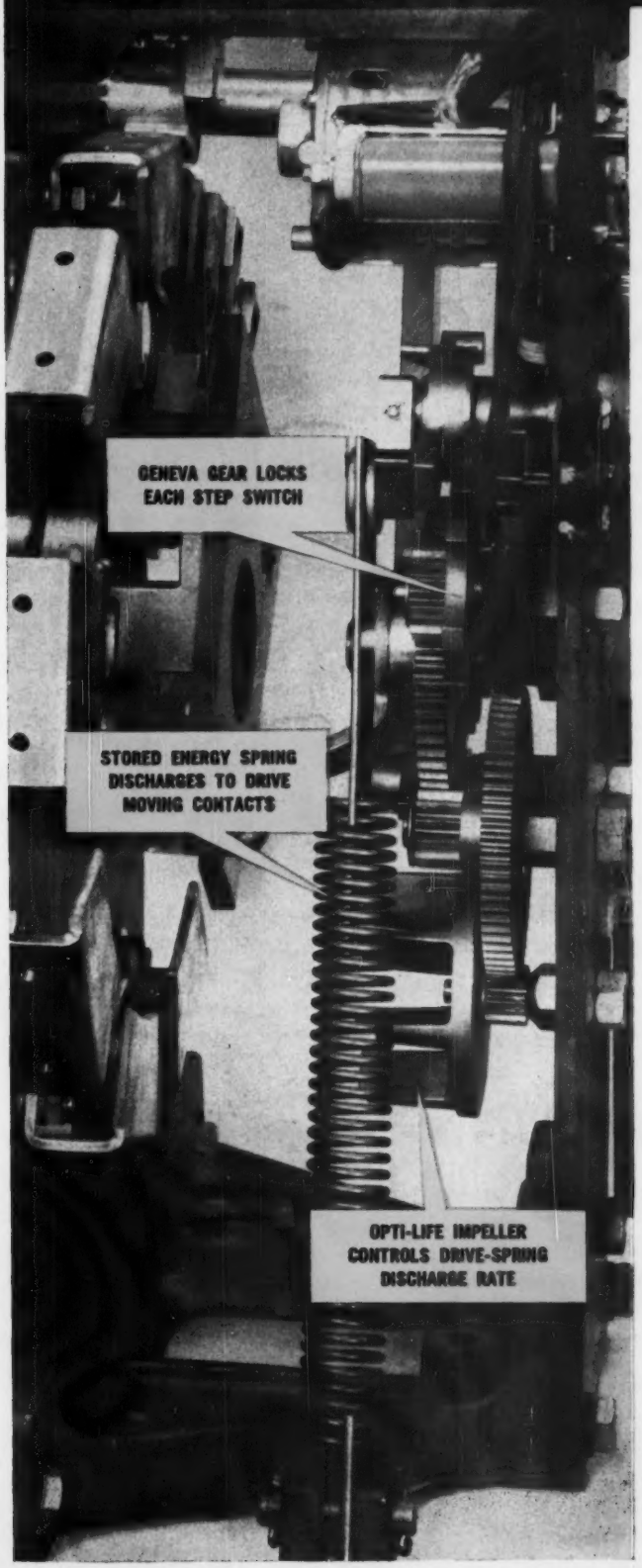
To overcome these disadvantages a control scheme was developed which incorporates the features of the latching contactor system without the use of large auxiliary devices. The key to the scheme is a low-voltage remote-control relay, well known in commercial and residential lighting control applications. It is a latching-type relay which is small enough to fit a ½-in. knockout. Its contacts are rated 1 hp, 20 amp, 125 v ac, or 20 amp, 277 v ac—more than ample for the small current required by most motor starter coils.

The coil rating of the remote control relay is 24 v. This voltage was obtained in the installation at Alexandria, La., from a tap on the control transformer in the 440-v starter which provided 110 v for starter contactor coil.

The new scheme was adopted after life-cycle tests of the remote control relay showed that it will withstand 300,000 cycles of mechanical operation. The remote-control relay was mounted in a ½-in. knockout on an angle bracket inside the starter enclosure. In the case of failure, a relay can be replaced by disconnecting two 110-v leads and three 24-v leads, inserting another relay and reconnecting the wires. The replacement remote-control relay costs about $2 and can be obtained from most contractors.

(*More EUM on page* 94)

ANOTHER STEP AHEAD IN VOLTAGE REGULATION


GENEVA GEAR LOCKS EACH STEP SWITCH
STORED ENERGY SPRING DISCHARGES TO DRIVE MOVING CONTACTS
OPTI-LIFE IMPELLER CONTROLS DRIVE-SPRING DISCHARGE RATE

CONTROLLED REGULATOR SWITCHING SPEED

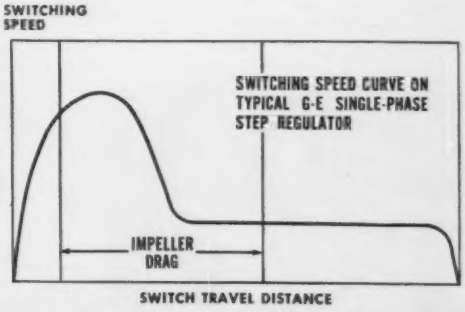
General Electric voltage regulator switches operate 20 years without inspection . . . give you maximum contact life

As regulator users know, there is an optimum tap-changing speed for maximum contact life. Optimum speed must be *controlled* and *non-linear*.

General Electric's exclusive Opti-life switch satisfies these requirements. Results: contacts "break" fast to reduce arcing. Contacts "make" at a calculated rate to (1) reduce mechanical abrasion of contacts, and (2) reduce arcing from contact "bounce."

Truly *controlled* speed of General Electric Opti-life switches is achieved by a fast-action drive, *plus* an oil-immersed impeller which dampens switch velocity as contacts close.

Benefits to you: maximum contact life. In fact, it *isn't necessary to periodically inspect* the interior of a General Electric ML-32 regulator. Under normal operation, switch inspection shouldn't be necessary *for at least 20 years*. You save money!


SWITCHING SPEED
SWITCHING SPEED CURVE ON TYPICAL G-E SINGLE-PHASE STEP REGULATOR
IMPELLER DRAG
SWITCH TRAVEL DISTANCE

FOR MORE REASONS WHY G-E regulators cost less on the line—see your General Electric regulator representative. Or, write General Electric Company, Section 456-05, Schenectady 5, N. Y. *Voltage Regulator Product Section, Pittsfield, Mass.*

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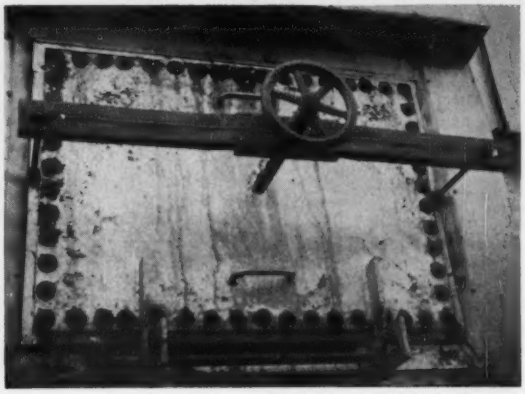
SAFETY & OPERATIONS



Doorjack Eliminates Hazard, Saves Time

JOHN LEONARD, Master Maintenance Man, Captina Operating Co, Cresap, W. Va.—AEP System

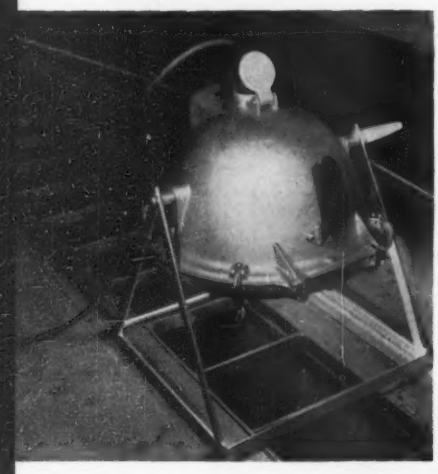
A simple doorjack reduces the hazard and alleviates the bruised-knuckle circumstances associated with the removal of pressure-backed recirculating gas fan doors. The jacking device saves from 1½ to 2 man-hours per door opened, or an estimated one hundred man-hours per year.

Originally, when removing the fan doors while the boiler was in service, as the last bolt was removed, and often before the last bolt was removed, the door would be pushed open with a rapid thrust. Also, closing the door against seal air pressure required three and sometimes four men. The jacking device, fabricated at the Kammer Plant of the Captina Operating Co relieves this hazardous and tricky operation.

The doorjack is constructed of a piece of 3-in. channel, 48 in. long. An 18-in. long threaded stud, with an old valve wheel welded onto its outer end, is screwed into the 1½-in. nut, which had previously been welded over a clearance hole in the center of the channel.

The channel, slotted near the ends to receive ⅝-in. mounting bolts, is first positioned across the face of the door. Mounting bolts are then passed through the channel slots and screwed into ⅝-in. nuts welded to each side of the door frame. Additional nuts on the mounting bolts are tightened down to secure the channel in place over the door. The handwheel is turned to tighten the jackbolt against the door. To maintain the jackbolt in a fixed, centered position against the door, a collar was welded to the door to receive the end of the jackbolt.

Thus, with this jackbolt tight in place, the door bolts can be safely removed—then, the jackbolt can be slowly backed off to gradually relieve the back-pressure. Also, the jackbolt can be used to overcome the back-pressure when the door is being replaced.



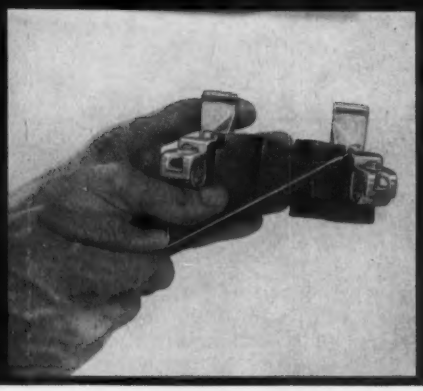
Simple Stand Solves Lighting Problem

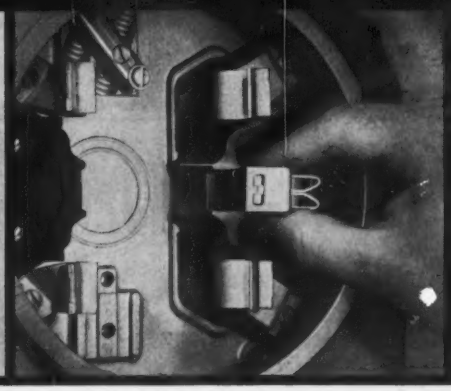
H. P. BROWN, Yard Foreman,
R. L. FLIMING, Assistant Yard Foreman, Ohio Power Co, Beverly, Ohio—AEP System

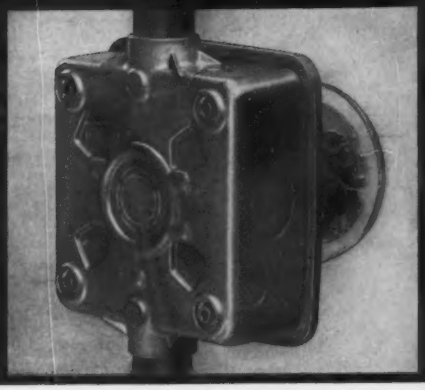
A simple, easily constructed mounting stand enables workmen at Ohio Power Co to readily direct a heavy 20-in. floodlight for illuminating poorly lighted work areas.

The 20 x 22-in. frame is made of ½ x 1-in. strips of flat steel welded together. The floodlight is pivoted 18 in. above the base and can be rotated vertically through 360 deg. A fitting attached to the pivot can be tightened to hold the light at the desired angle.

For work in areas such as coal bunkers, it provides a solution to problems experienced with drop-cord lights and their limited life.







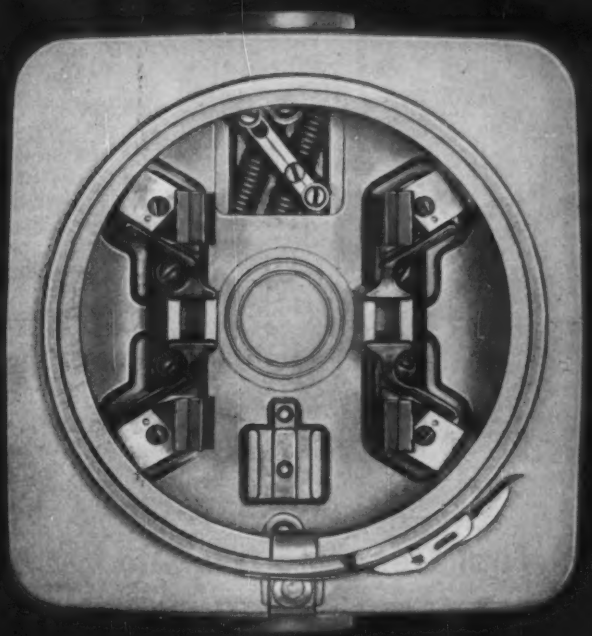
NEW S-2 TERMINAL BLOCK ASSEMBLY—with exclusive one-piece combination jaw and connector strap—permits an unbroken current path from meter blades to line wires for excellent electrical conductivity, low heat rise, for added reliability.

NEW PLUG-IN TERMINAL, another General Electric S-2 exclusive, installs in seconds—without tools, and without removing any part of the meter socket . . . greatly simplifying shop or field conversion to five or six terminal sockets.

EXCLUSIVE SQUARE DIE-CAST ALUMINUM CASE—with baked-on all-weather finish—gives maximum strength, corrosion protection . . . provides full raintight construction . . . unitized hubs. And, modern styling eliminates sharp, hazardous corners.

General Electric Announces . . .

NEW S-2 SQUARE METER SOCKET



General Electric S-2 sockets—for all 100-amp services—offer two **exclusive** new features providing greater reliability, increased versatility.

GREATER RELIABILITY is provided by unique one-piece combination jaw and connector strap—permitting an unbroken current path from meter blade to line or load wires with minimum heat rise.

INCREASED VERSATILITY results from the only true plug-in terminal on the market today . . . installs in seconds—without tools—for easy conversion to five or six terminal socket.

PLUS 6 EXTRA VALUE FEATURES

1. **Largest wiring space** of any die-cast socket—144 cubic inches—permits fast, easy wiring.
2. **Die-cast aluminum case**—plus baked-on finish—protects against corrosion and weather.
3. **Lay-in wire connectors** accommodate both aluminum and copper wire.
4. **Positive one-way knockouts** provide a perfect knockout every time . . . eliminate prying or bending.
5. **Choice of neutral connectors**—two channel or single lay-in neutral connector.
6. **Unitized hubs** are cast as part of case . . . no extra charge for second hub at bottom.

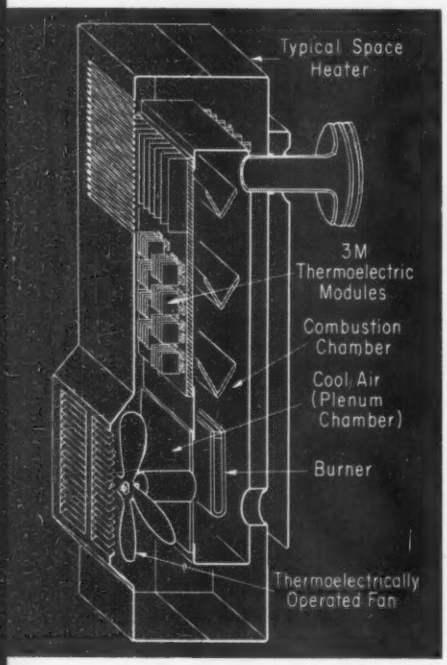
NOW AVAILABLE. *Contact your G-E Sales Office or Authorized Distributor for full S-2 information. Or, write General Electric Company, Somersworth, N. H.* 711-01

METER DEPARTMENT

GENERAL ELECTRIC

Gas Heater Uses Thermoelectric Generator

A new gas-fired heating system, which would operate normally during power failures and also provide a source of stand-by electrical power during such emergencies, could be the outgrowth of a device developed by Minnesota Mining & Mfg Co. It was shown recently at American Gas Assn's "Festival of Flame."



The wall heater uses a thermoelectric generator to provide electrical energy required to operate the fan circulating warm air throughout the room. The generator draws its heat directly from the heater's combustion chamber (left).

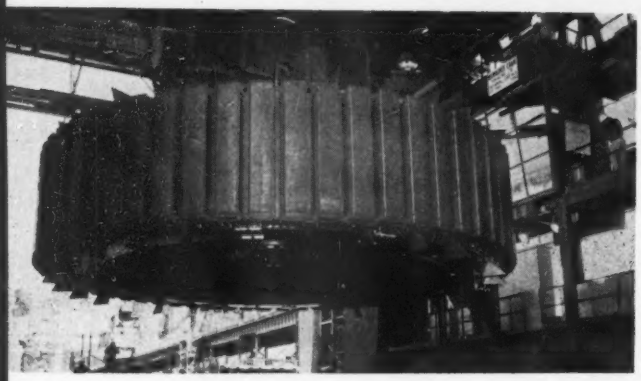
3M designed and built the device based on experience it gained from developing "Snap III" for Atomic Energy Commission. This was a device which produced electricity directly from an isotope heat source.

According to 3M, development of the new heating system means that, with materials and know-how now available, similar thermoelectric generators could be built for any forced air or hot water central system—making such systems, for the first time, completely independent of outside power. The company believes it is up to heating equipment manufacturers and heating fuel suppliers, working cooperatively on considerable additional development, to determine when and whether such heating systems may be put on the general market.

The purchaser, 3M points out, would pay only the cost of the original equipment. There would be no increase in fuel costs, for all the heat converted by the generator into electrical power would be dissipated as heat within the home. Cost of electrical power otherwise required would be eliminated, and there would be practically no maintenance costs, since a thermoelectric generator has no moving parts. Elimination of noise and sudden drafts would be provided through the very gradual start-up and shut-off of the system's air circulation.

The company is conducting an extensive generator development program, through which it hopes to build on experience gained in its research in the generator and heat pump field so far. In this, it looks to the commercial markets for possibility of the most substantial production volume. It is also placing some emphasis, in its research, on the development of products for military and other government markets.

First Generator Installed at Niagara Hydro Power Project



595-TON ROTOR for 150-kw generator is lowered into stator at Niagara Generating Plant

Westinghouse Electric Corp has begun installation of the first of 13 150-kw waterwheel generators for the $720-million Niagara Power Project being built by New York State Power Authority. Due to a major power shortage in the area, the construction schedule has been accelerated, says the manufacturer.

Transformers will step up each generator's 13.8 kv to 115, 230 or 340-kv, depending upon requirements.

Each generator weighs 1,115 tons, is 40 ft in dia, and each rotor spins on a 50-ton shaft, 50 in. in dia. Outer edge of the rotor in each generator will rotate at 120 rpm. A 630-ton traveling crane assembles parts.

Combined 1,950-Mw output of all 13 generators will be augmented by 240 Mw from nearby Reservoir Pump-Generating Plant. Total installed capacity of 2,190 Mw will surpass the 1,974-Mw capacity of Grand Coulee, the largest hydroelectric power source in the US.

(*More News of Manufacturers, page* 98)

WITH NEW GENERAL ELECTRIC **SOLID-STATE** SUPERVISORY EQUIPMENT YOU CAN . . .

Cut Maintenance Expense, Save Floor Space, Speed Installation

The basic design simplicity of General Electric solid-state supervisory equipment with transistorized logic elements can cut your maintenance time and expense. These computer-designed and factory pre-tested logic elements are easier to check. They have no moving parts, require no adjustments. No special tools or electronic equipment are required for normal maintenance. For even faster, easier maintenance, an optional test device is offered.

You save valuable space. Compare a conventional master station's measurement of 24 by 28 inches, in width and depth, with the 20 by 15 inches of comparable solid-state equipment. The new General Electric supervisory can save you up to 50 percent floor space. Unit weight is reduced up to 25 percent.

Fast installation is still another important benefit. Manufactured for "off-the-shelf" delivery, these rugged new plug-in logic elements are pre-tested at the factory to save installation time and expense. With no moving parts, there are no adjustments.

Get all the facts now on the General Electric solid-state supervisory equipment from your nearest Apparatus Sales Office, or write for publication GEA-7043, General Electric, Schenectady 5, N. Y. 513-11

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Bronco Portable High Voltage Cables are built for continuous duty under the toughest, most rugged working conditions to which you can assign a portable electrical cable. They last longer because they are doubly protected. Unsurpassed external protection against oil, ozone, sunlight, abrasion, acids and alkalies is provided by the famous Bronco 66 jacket, a seamless sheath that is certified by a Registered Professional Engineer to contain not less than 67.32% neoprene—highest content in the industry. Internally, each conductor is insulated with Bronco XL Butyl, an advanced material with great inherent dielectric strength, with extraordinary resistance to high temperatures, corona, and aging. The assembled cable is Synchro-Cured, an exclusive Bronco process that provides the cable with a high degree of resilience. Bronco 66 Certified bounces back from extreme mechanical shock, stays on the job under crushing forces that defeat lesser cables. A big plus value is Bronco's patented (U. S. Patent 2867001) branding; complete identification is repeated at exact two-foot intervals on the jacket—vulcanized in so it can't be rubbed off. Bronco 66 Certified High Voltage Types W, G, and SH (shielded types A, B, C, and D) are now available to users through Electrical Wholesale Distributors. Write for a complete description of Portable High Voltage Bronco 66 Certified. Also ask for data on our duct and direct-burial high voltage items.
ELECTRICAL CONNECTORS
DESIGNED FOR WIRE BY A WIRE MANUFACTURER
BRONCO GRIP
Selected from the extensive Bronco-Grip line of fittings and connectors, shown here in the Type F, high compression, Vise Grip Connector. Features: single bolt with full thread engagement, high re-usability, installed without disassembly, won't fall off line, full compression with any combination of conductor sizes, rounded contours for neat taping. Write for Bronco-Grip Catalog.
WESTERN INSULATED WIRE COMPANY
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BRONCO
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Manufacturers Briefs

• **A. B. Chance Co** has announced it will consolidate pole line hardware production at headquarters in Centralia, Mo., when it closes its Pittsburgh plant next April.

• **Cutler-Hammer, Inc,** has begun operations at a new plant at Belmont, Calif., where it is producing motor control and power distribution equipment.

• **ASEA** of Sweden, through its subsidiary in N.Y.C., has been awarded a contract for generators totaling $1,277,100 by Tennessee Valley Authority for the TVA Melton Hill Project. Operation is scheduled for the spring of 1963.

Manufacturers Literature

MEDIUM LOADING STAKING... and stringing-sag tables, one of four newly revised booklets presenting latest data for wider range of ACSR, from AWG 6 to 4/0, Form 17-11413, 40 pages. This alone or entire series of Rural Line Engineering Data Booklets may be ordered from any Alcoa/Rome sales office or Aluminum Co of America, 760 Alcoa Bldg, Pittsburgh 19, Pa.

STANDARDS . . . proposed for capacitor switches for alternating-current distribution systems, AIEE No. 79, 12 pages, 40¢; proposed recommended guide for measuring ground resistance and potential gradients in the earth, AIEE, No. 81, 20 pages, 70¢; proposed test procedure for impulse voltage tests on insulated conductors, AIEE No. 82, 12 pages, 50¢; proposed test procedure for radial power factor tests on insulating tapes in paper-insulated power cable, AIEE No. 83, four pages, 50¢; and proposed test procedure for determining tensile strength and hardness of lead sheaths, AIEE No. 84, four pages, 50¢. American Institute of Electrical Engineers, 33 W 39 St, NYC 18.

STEEL PIPE AND TUBING . . . for high-temperature service. Data on 15 most commonly used Croloy steels, also on carbon steel and molybdenum steel. Folder T-467, six pages. More complete information on these and other pipe and tubing steels given in Technical Bulletins 1, 6, and 9. Babcock & Wilcox Co, Tubular Products Div, Beaver Falls, Pa.

Bristol Dynamaster* Electronic Instruments have proved themselves in thousands of installations. They fully meet today's most exacting standards of accuracy and dependability. They measure almost any variable that can be translated into an electrical quantity (d-c current, d-c voltage, resistance or capacitance). Just a few are: temperature, pH, speed, voltage, smoke density and strain.

Here are some outstanding features that make them ideal for industrial plants, pilot plants, and for research, test, and laboratory use:

1. Continuous standardization—eliminates standardizing mechanism and dry cell—no interruption to control. **But retains precision standard cell for highest accuracy and stability.**

2. Simple design—few moving parts.

3. Easy to use and service—little or no maintenance required.

4. Rugged construction—unaffected by vibration.

MODELS FOR EVERY PURPOSE. Dynamaster Instruments are now available as:

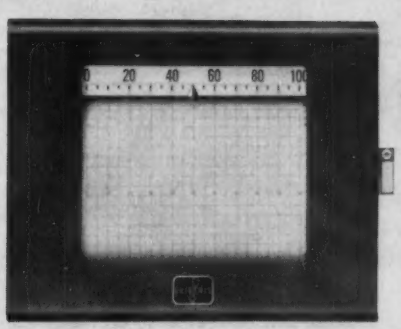
A. Single-pen, two-pen, and multiple-record (up to 24 points) strip-chart instruments.
B. One- and two-pen round-chart recorders.
C. High-speed recorders (0.4 second).
D. X-Y recorders.
E. Extended range recorders.
F. Adjustable span and zero recorders.
G. Miniature 3-inch strip-chart recorders.
H. Electric controllers in both strip- and round-chart models—all types of control action and as time-program control.
I. Pneumatic controllers in both strip- and round-chart models—all types of control action and time-program control.
J. Instruments for electronic measurement—pneumatic transmission of reading by 3-15 psi signal.
K. Round chart program controllers.
L. Telemetering transmitters.
M. Drum-type precision indicators.
N. Multi-bank recorder—will accept up to 200 separate inputs and record them on 12-inch wide strip chart.
O. Relay-rack mounting models—most models available in case that fits standard 19" relay-rack without modification to instrument or rack, without panel-cutting or masking.

Bristol Dynamaster Potentiometer and Bridge Instruments can be equipped with analog-to-digital encoders of various types for digital readout and computer use. For complete details, write for Bulletins P1245A, P1270, P1271, P1242, and P1282. The Bristol Company, 116 Bristol Road, Waterbury 20, Conn.

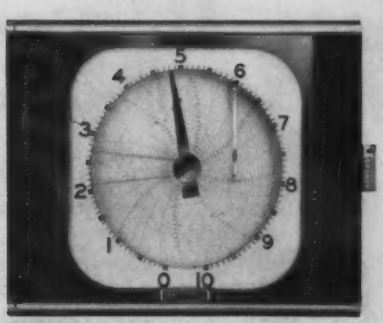
*T. M. Reg. U. S. Pat. Off.

look to Bristol for the complete line of

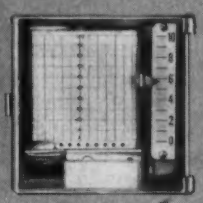
ELECTRONIC POTENTIOMETER and BRIDGE INSTRUMENTS



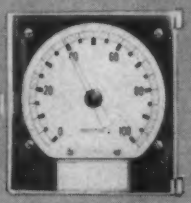
Dynamaster* Electronic Potentiometer or Bridge—records on 11-inch, 120-foot-long strip chart.



Dynamaster* Electronic Potentiometer or Bridge—records on 12-inch round chart, indicates on extra-large scale.



RECORDER

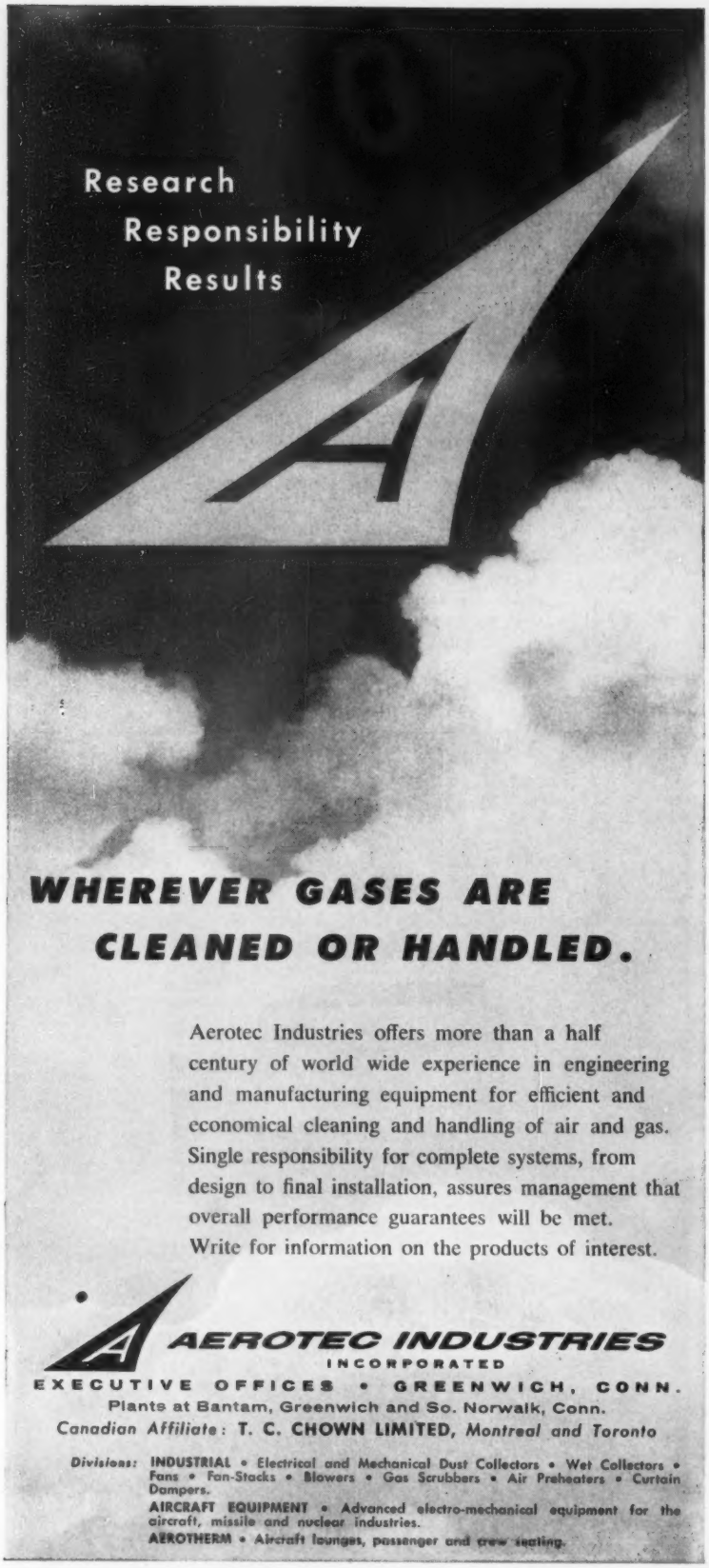


INDICATOR

Plug-in Miniature Electronic Dynamaster Potentiometer and Bridge instruments—Only 5" x 5⅛" panel dimensions; ideal for graphic panel instrumentation.

BRISTOL
TRAIL-BLAZERS IN PROCESS AUTOMATION

AUTOMATIC CONTROLLING, RECORDING AND TELEMETERING INSTRUMENTS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Aerotec Industries offers more than a half century of world wide experience in engineering and manufacturing equipment for efficient and economical cleaning and handling of air and gas. Single responsibility for complete systems, from design to final installation, assures management that overall performance guarantees will be met. Write for information on the products of interest.
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AIRCRAFT EQUIPMENT • Advanced electro-mechanical equipment for the aircraft, missile and nuclear industries.
AEROTHERM • Aircraft lounges, passenger and crew seating.

Congressional Committee to Compile Regulatory Survey

The Joint Economic Committee's subcommittee on automation and energy resources is compiling replies it asked for from federal and state agencies which regulate fuels and energy sources; but the subcommittee won't meet to review this information until after the November elections.

Whether a report will be issued by the subcommittee hasn't been decided.

The energy resources subcommittee in June had specifically asked the Federal Power Commission, Atomic Energy Commission, Interior Department, Office of Civil & Defense Mobilization, plus numerous state regulatory and research commissions the following:

(1) What is the statutory basis for your agency's relationship to energy resources—is it regulatory, technical or research-directed?

(2) Give a brief resume of the development of this relationship.

(3) Define the statutory objectives of your agency's program, or programs—and explain any administrative interpretations of these.

(4) Summarize the rules, policy declarations or directives that your agency issues for industry guidance.

(5) Indicate whether your programs infringe upon, mesh with, or are limited by similar programs of other agencies.

(6) What is the extent of any existing coordination or unresolved conflict between your agency and others?

(7) What is the most challenging issue, or difficult obstacle in administering your programs?

(8) Give any recommendations to improve the federal government's role—through improved research or regulation—in assuring necessary energy resources for "maximum production, employment and purchasing power" called for in the 1946 Employment Act.

Generally, the subcommittee is trying to find and define any existing governemental policies related to energy and fuels. It is considering the possibility of creating a national fuels policy—something the coal industry has been promoting for several years. The study grew out of 1959 hearings on energy needs.

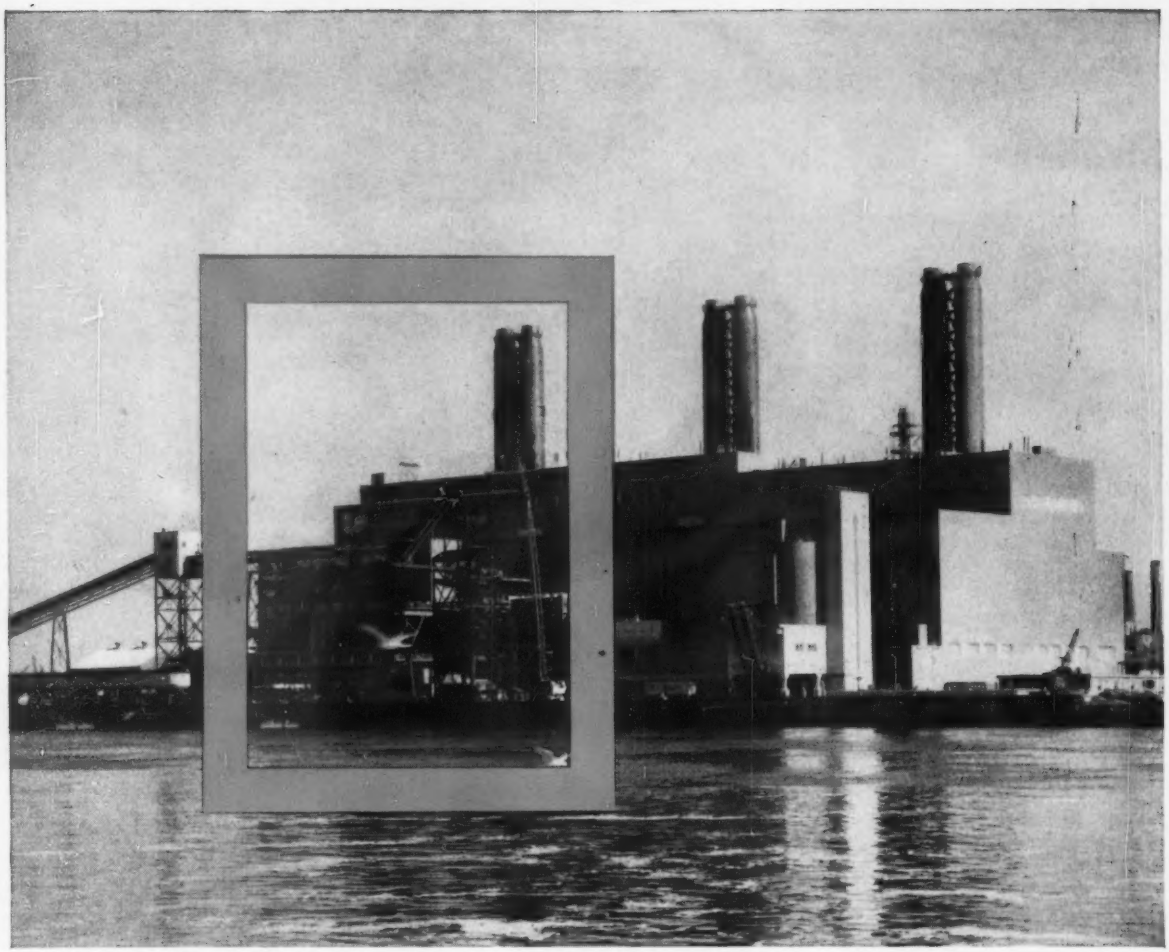
KNOW-HOW

Victor 900 Suspension Insulators (EEI-NEMA, TDJ52-3) are universally used by utility men because they're rugged and built to last.

Looking at a VICTOR Suspension insulator, you'd think it was an easy item to manufacture. It isn't. You don't just stamp them out like cookies, bake them in an oven and presto—insulators. No, a lot of research, engineering and manufacturing know-how over a long period of years is required to produce insulators that have uniform performance characteristics and far exceed EEI-NEMA standards.

VICTOR has an enviable reputation for knowing how to make insulators that are superior in performance under the most gruelling conditions of service. Many a power man has decided to play safe . . . and choose VICTOR. For catalog, specifications and prices, contact your nearby Victor sales office. Victor Insulators Division, I-T-E Circuit Breaker Company, Victor, N. Y.

I-T-E CIRCUIT BREAKER COMPANY



At Consolidated Edison's Astoria Station Unit No. 4 . . .

NEW PHELPS DODGE TECHNIQUE

WELDS-IN ALUMINUM BRASS CONDENSER TUBES!

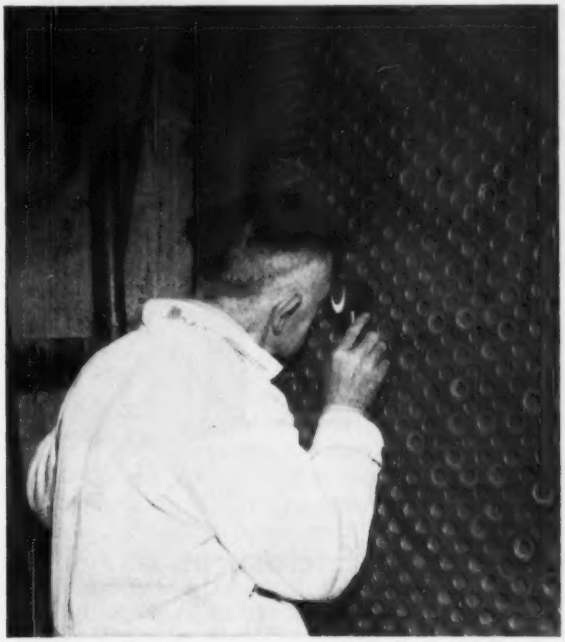
The first welded main condenser using aluminum-brass condenser tubes has recently been completed at Consolidated Edison's Astoria Station. This condenser will help to add a 357,000 KW block of generating capacity to the line in 1960. Half of these tubes were manufactured by Phelps Dodge under rigid specification. All of the tubes were welded in by the M. H. Treadwell Company under Phelps Dodge supervision. In tests to date, the welded condenser tube joints have surpassed performance predicted for them.

Specially designed Phelps Dodge welding guns which automatically weld tubes to tube sheets were used by Treadwell. The entire operating cycle for these guns is controlled by preset relays and timers. These relays and timers start, stop and regulate electrode motion, welding current and argon flow.

This new technique, pioneered in Phelps Dodge laboratories, answers an industry need for more positive, permanent protection from tube joint leakage. It is another in the long list of significant contributions Phelps Dodge has made in the heat exchanger and condenser tube field during more than 40 years of outstanding service.

In first step, tubes are installed in the main condenser and flared prior to welding operation. Careful attention is paid to keeping tube joints clean at all times.

Tubes are welded securely to tube sheet with special type gun. Average operator makes a completely tight weld in less than thirty seconds for each tube.



Individual tube welds are carefully inspected with magnifying glass. Incomplete or unsound welds are corrected by re-welding.

Additional inspection test consists of painting soap bubble solution on tube sheet. When main condenser is placed under 5 psi air pressure, leaks are readily detected.

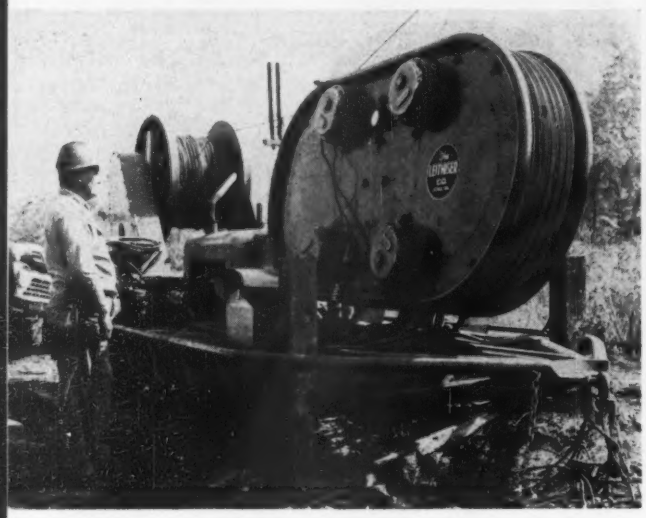
PHELPS DODGE COPPER PRODUCTS

CORPORATION

300 Park Avenue, New York 22, N. Y.

PD

New Equipment

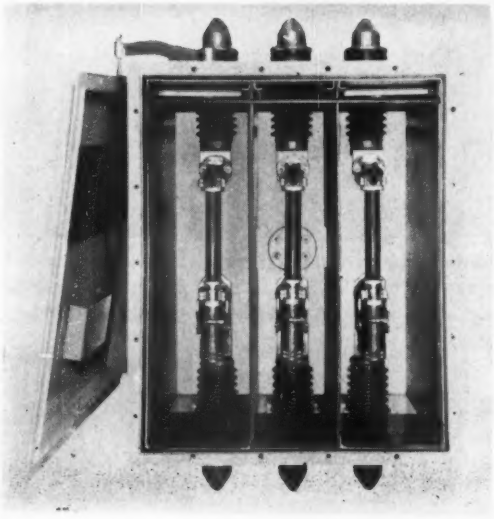


Stringing Device . . .

. . . for takeup of pulling line and payout of conductor has hydraulic drive, which affords continuously variable control of tension to 20,000 lb. Tension remains as set whether the speed, forward or reverse, is fast or slow. A special assembly, with variable traverse speed, guides the line to wind on evenly. Operation of the combination takeup and payout machine is from a control console.
Leithiser Co, 366 S Sherman St, York, Pa.

Distribution Transformers . . .

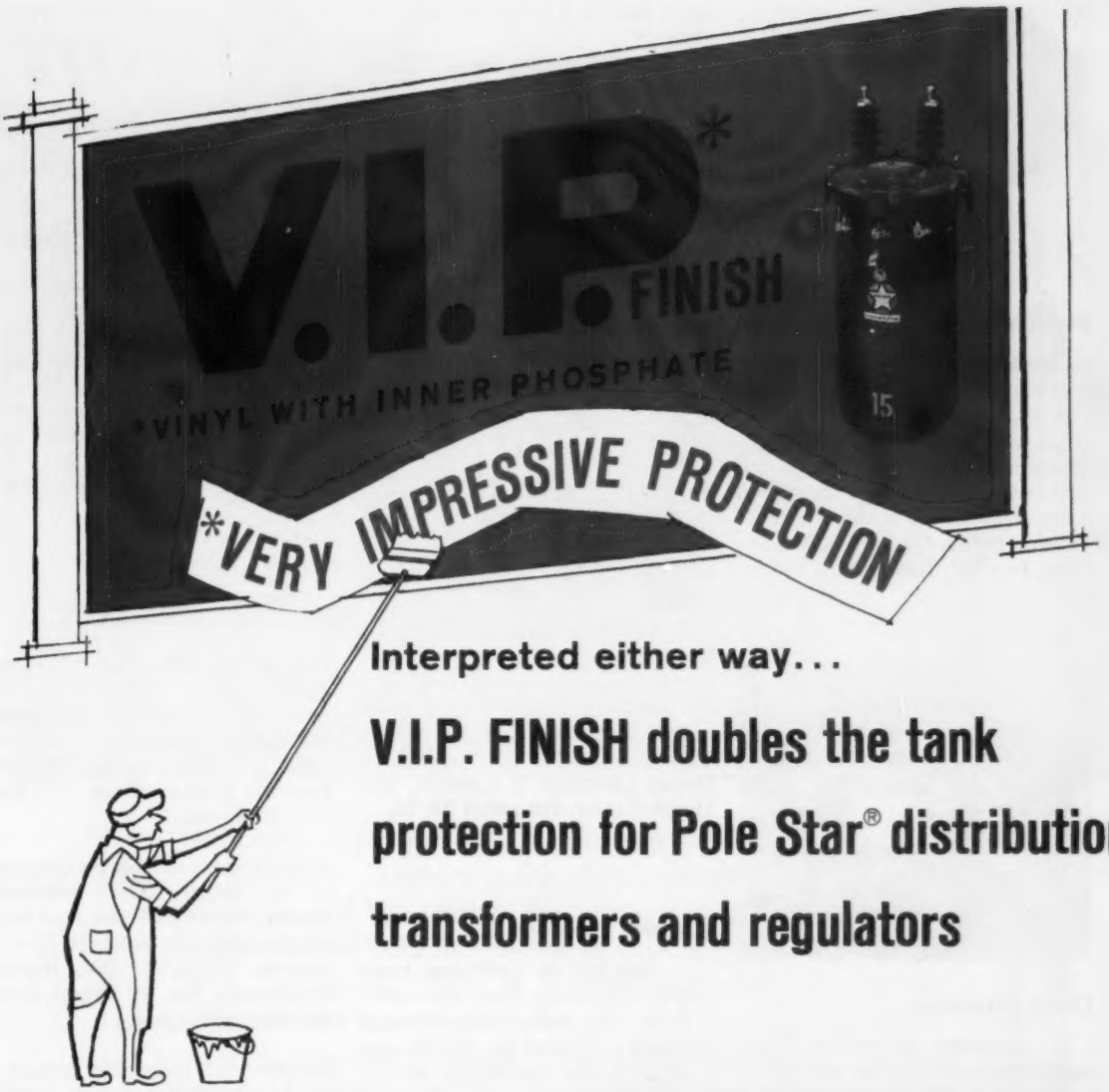
. . . for pole mounting have plastic-coated covers for protection against outages caused by wildlife. A single stainless steel captive bolt secures the cover. The top rim of the tank is rolled more than 400 deg for strength against distortion, and the frame has high strength to withstand short-circuit forces. Three-point suspension of the core-and-coil assembly results in a low sound level. They are available through 100 kva.
Moloney Electric Co, St. Louis 20, Mo.



Submersible Enclosures . . .

. . . for power fuses are rated at 13.8 kv, 95 kv BIL, and furnished in two designs. That shown, intended for confined spaces such as vaults, has a suspension-type door to minimize front and side clearances. Suspension point can be right or left. The other type metalclad enclosure has a hinge-type door. Both accommodate 400-amp, 13.8-kv boric-acid fuses. They are fitted with pressure relief valves.
S&C Electric Co, 4435 N Ravenswood, Chicago 40, Ill.

(More New Equipment on page 106)



Interpreted either way...

V.I.P. FINISH doubles the tank protection for Pole Star® distribution transformers and regulators

When introduced last year, V.I.P. Finish was the culmination of 15 years of research on the protection of transformer tanks against water, ice, smog, salt spray and wind. V.I.P. Finish is *more* than a paint. Basically a *vinyl* finish with an *inner phosphate* coating, V.I.P. Finish is a complete metal finishing process. Its five steps include careful pretreatment and preparation of the metal, followed by meticulously controlled application of the various coats.

The resulting finish provides not only extra-high *primary* resistance to moisture, alkali and acids . . . but also sets up a secondary or insurance barrier that prevents the spread of corrosion if any bare metal becomes exposed, as in the case of accidental scratching. Spots can be touched up with assurance no underfilm corrosion will occur.

Tests show superiority of V.I.P. Finish

Both transformers shown were exposed for 2500 hours in a salt spray cabinet, then were placed outdoors in an industrial atmosphere for 2½ years. The transformer protected with V.I.P. Finish (right) shows hardly any effect from its ordeal, whereas the other transformer—which started with a good finish by previous standards—is badly corroded.

PENNSYLVANIA POLE STAR **DISTRIBUTION TRANSFORMERS AND REGULATORS**

Pennsylvania Transformer Division • McGraw-Edison Company • Canonsburg, Pa.

Switches . . .

. . . for heavy duty are rated at 2 hp, 250 v ac or 1 hp, 20 amp, 125 v ac. The single-pole, double-throw 2HL series precision switches are available with a variety of actuator and terminal types. Greatest dimension is the 1-15/16-in. length.
Unimax Switch Div, W. L. Maxson Corp, Ives Rd, Wallingford, Conn.

Data Processor . . .

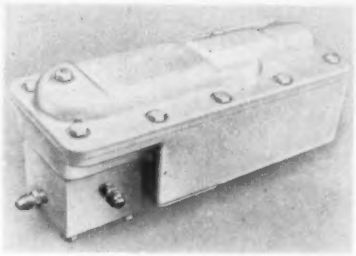
. . . composed of building block units is expansible by the addition of components. The central processing unit has to 40,000 positions of magnetic core storage. The character transfer rate is 4.5 μsec. The IBM 1410 has a second data channel in which processing can be carried out independent of operations in a first channel.
Data Processing Div, International Business Machines Corp, 112 E Post Rd, White Plains, N. Y.

Anti-Corrosion Coating . . .

. . . can be applied with a roller, by dipping or by spraying. Hinac chromate surface coating, which resists most acids, alkalis and oxidizing agents, protects mild steel, aluminum and other metals. The coating is furnished in various colors or clear.
Pennsalt Chemicals Corp, 3 Penn Center, Philadelphia 2, Pa.

Converter . . .

. . . takes a dc input and yields a pneumatic pressure signal as output. The PowrMag converter is shock and vibration resistant, is waterproof and is unaffected by ambients

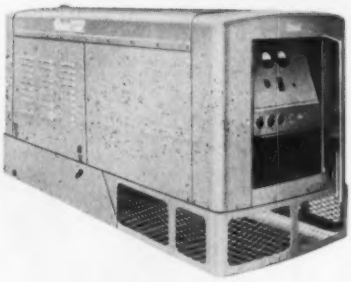


to 120F. Input can be 1-5 or 1-9 v or ma dc; four output pressure ranges between 0 and 30 psi are offered.
Hagan Chemicals & Controls, Inc, Hagan Center, Pittsburgh 30, Pa.

Control Centers . . .

. . . with 600 to 1,600-amp buses and voltage ratings from 110 to 600 v have been redesigned. Vertical buswork is braced for 50,000 rms amp on faults, double the former

value, and vertical wiring troughs have been increased to 30 sq in. from 27. Horizontal buswork can go at the top or bottom.
Allis-Chalmers Mfg Co, Milwaukee 1, Wis.



Generating Plant . . .

. . . delivers the same power at either 120/240 v single-phase or 120/208 v 3-phase. The gasoline-driven units are in 12 ratings from 6 to 85 kw.
D. W. Onan & Sons, Inc, 2515 University Ave SE, Minneapolis 14.

More New Products

Gas and liquid pressures over ranges 0-400 psi to 0-10,000 psi are measured by the TP-1000 **transducer,** which measures 2 in. long and 1.000 in. in dia.—Components Div, Fairchild Controls Corp, 225 Park Ave, Hicksville, N. Y.

Transistors are used in the generator of the model LG-75 **ultrasonic cleaner,** for which 1 and 2-gal tanks are available. Its power is 75 w.—Branson Ultrasonic Div, Branson Instruments, Inc, 40 Brown House Rd, Stamford, Conn.

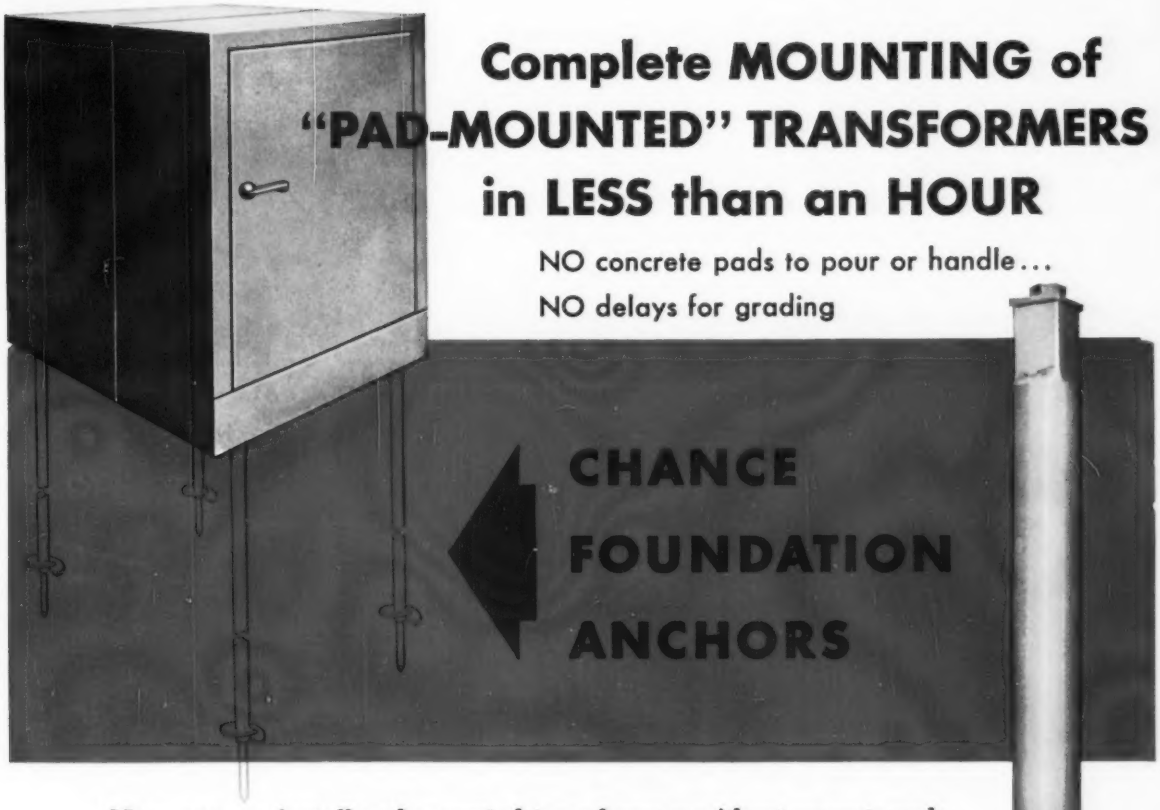
Portable and collapsible **screens** in 1, 3 and 4-panel models provide manhole protection, shielding from welding arcs and wind protection. Frames of 1-in. tubular steel with slip joints make assembly easy.—Singer Glove Mfg Co, 860 W Weed St, Chicago 22, Ill.

Solid-state **flame detector** monitors a furnace and operates a relay for an alarm in case of flame failure. The type UF1100B operates in ambients from —20F to 300F.—Bailey Meter Co, 1050 Ivanhoe Rd, Cleveland 10.

For motor rebuilding, one-piece molded **stator wedges** of polyester reinforced with woven fiberglass provide higher strength and easier driving than wood or fiber wedges.—Glastic Corp, 4321 Glenridge Rd, Cleveland 21, Ohio.

Complete MOUNTING of "PAD-MOUNTED" TRANSFORMERS in LESS than an HOUR

NO concrete pads to pour or handle...
NO delays for grading



Now you can install pad-mounted transformers *without concrete pads.* Chance Foundation Anchors make this possible . . . let you cut installation time by eliminating the need for special excavations, rock foundations and pouring concrete or handling pre-formed pads. You get a "foundation" that is impervious to seasonal changes because the anchors screw down below the frost level. Transformers can't move . . . they aren't affected by freezing, thawing, or moisture penetration. Mounting can be completed in less than an hour without waiting for the trench to be filled and graded.

Write for a detailed bulletin that shows how Chance Anchors can help you save time in the installation of pad-mounted transformers.

Two men—using a square shank wrench—can install Chance Foundation Anchors in 8 to 10 minutes per anchor. Installation is permanent, and the anchor helix supports, as well as holds down, the transformer.

When anchors are installed, they are checked for level, and attached to a transformer bracket. The transformer is then bolted to the bracket, and the job is ready for energizing, trench-filling, final grading and landscaping.

ABC INDUSTRIES

A. B. CHANCE COMPANY
CENTRALIA, MISSOURI
(A. B. Chance Company of Canada, Ltd., Toronto)

CA60-34

THEY DO THE JOB BETTER WITH THE RIGHT WORKING GEAR

Mine Safety Appliances Company makes the "right" working gear. *Right* because it keeps crews safe. *Right* because it's comfortable to wear. *Right* because it's convenient to use. And *right* because it lasts and lasts a long, long time.

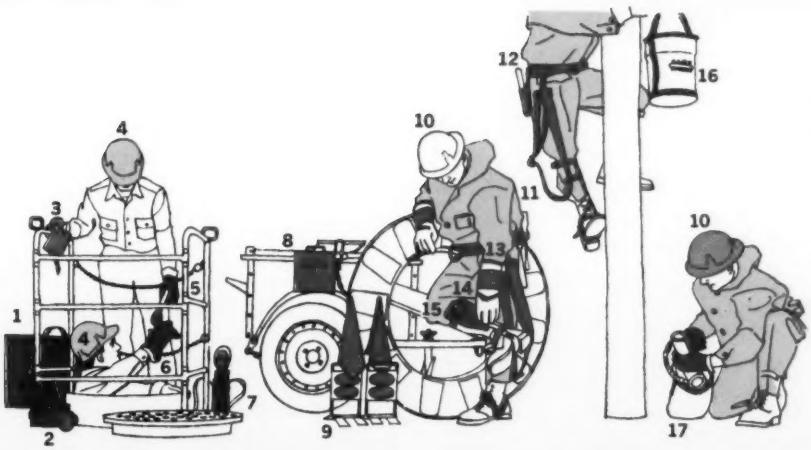
The men in the above situation are demonstrating a typical cross-section of our product line for electric utilities, from manhole to pole top. We control quality and specifications of each and every item . . . *at MSA*.

Our products protect sensitive noggins. Sniff out atmospheric hazards. Help anchor the climber's swift sure feet. They insulate his hands against the hot stuff. Keep him dry in foulest weather. Secure his waist while high above the ground. Carry things to him he can't carry with him. Warn oncoming motorists.

Some of our products only sit and wait. Products like First Aid. Resuscitation devices. Emergency rescue equipment.

We'd like you to weigh the comparative advantages of MSA's product performance. For a demonstration, technical assistance or specific product bulletins, write: Mine Safety Appliances Company, Pittsburgh 8, Pennsylvania.

MSA SAFETY EQUIPMENT HEADQUARTERS **MINE SAFETY APPLIANCES COMPANY**



Legend for MSA Product Identification:
1. Air Line Respirator. **2.** Oxygen Indicator. **3.** Explosimeter Instrument. **4.** Shockgard Caps. **5.** CO Tester. **6.** Work Gloves. **7.** H_2S Detector. **8.** First Aid Kit. **9.** Road Markers. **10.** Shockgard Hats. **11.** Coated Rainwear. **12.** Lineman's Belt and Pole Strap. **13.** Lineman's Rubber Gloves. **14.** Leather Protector Gloves. **15.** Brooks Climbers. **16.** Tool Bucket. **17.** Line Hose Bag.

Blackburn Laboratories Develop New, Improved contax

(Oxide-inhibiting compound)

HARMLESS TO LINEMEN'S GLOVES AND IMPROVES CONNECTION PERFORMANCE

Extensive laboratory tests by Blackburn, confirmed by an independent manufacturer of rubber goods, prove conclusively that BLACKBURN'S Contax has no adverse effect on linemen's rubber gloves and blankets.

In addition, Contax gives improved connection performance. It penetrates the oxides on conductors to reduce connection resistance. It inhibits oxidation and galvanic corrosion by sealing out moisture and air from the connection surfaces.

Contax comes in crack-proof, see-through, plastic squeeze bottles. It's a non-petroleum, synthetic polymer grease with suspended zinc particles . . . has an extremely low moisture absorption rate, and is usable over a wide temperature range. Contax is non-toxic and flame resistant . . . will not harm the skin.

For detailed test data, send for Data Folder #6009.

Jasper BLACKBURN Corporation

1525 Woodson Road **St. Louis 14, Missouri**

Electrical World

NOVEMBER 7, 1960

Management Newsletter

Eleven Utilities Boosted Market Price More Than 250%

Company	Region	% Increase in Market Price*
Florida Power & Light	South	925
Texas Utilities	Southwest	492
Tampa Electric	South	387
Florida Power Corp	South	334
Tucson Gas, Electric Light & Power	Southwest	331
El Paso Electric	Southwest	318
Missouri Public Service	Midwest	318
Central & South West	Southwest	305
Houston Lighting & Power	Southwest	304
Public Service of New Mexico	Southwest	279
Virginia Electric & Power	South	258

Note: Data computed from statistics collected by C. A. Turner, Chicago. *–Reflects stock splits occurring between March 10, 1950 and February 18, 1960.

How Utility Commons Fared in the Fifties-III

Common stock prices soared 250% or more for the 11 electric utilities above and 150% or more for at least 24 other utilities during the decade of the Fifties. But while a handful of standouts shared the blue-ribbon honors (most spectacular example: Florida P&L's stock rose 925%), the electric utility industry as a whole did well too; for the Dow Jones utility average climbed 113% during the decade. Thus, most electric utilities in the nation shared in the rise of the great Bull market of the Fifties.

As pointed out earlier in this series, these spectacular gains in market price evolved from two basic factors: **(1) Increased earnings-per-share (EPS), and (2) Increased** price-earnings ratios (PER). In the Fifties, the utilities were extremely successful on both counts. They generally managed to nudge *both* price determinants upwards. Roughly a dozen companies, for example, managed to increase earnings-per-share or price-earnings ratio (or both) by more than 100%. And one and one-half times as many electric companies managed to rack up a gain of from 66⅔ to 100% in either EPS, PER, or both—a respectable market performance by any standard.

Incidentally, the figures throughout this series were drawn from a sample of 126 electric utilities, including both operating and holding companies. As mentioned previously, some 20 of these companies were necessarily excluded from the computations because their earnings and price data did not extend as far back as 1949 —the beginning of the period of comparison. A few of these companies might well have placed among the top performers in market price appreciation if their full, ten-year earnings history were available.

Just how much effect did increased earnings and higher investor confidence have on the market prices? In this, the third (and last) installment of this series, we shall see.

Before becoming over-awed by the spectacular performance of a few individual companies, it is well to consider the arithmetic involved in calculating the ten-year percentage increases. An overall, ten-year price increase is due to the *combined* influence of both earnings-per-share and price-earnings ratio.

At first glance, the percentage increase in selling price appears to be the sum of the percentage increases in PER and EPS. Of course, this is not the case. As earnings-per-share and price-earnings ratio rise, they have a combined *multiplier* effect on market price. What results is actually an exponential rise in market price. In other words, as the percentage gain in EPS and PER takes place, it gives rise to an ever-greater percentage advance in market price.

This has the following important effect on the ten-year performance of the 126 utilities in this study: **(1)** Companies that started out on an abnormally low price base (*and many top performers did*) were able to make remarkable percentage increases; **(2)** Successive percentage increases in market price become statistically easier to accomplish. This means that a company that made, say, a 300% increase in market price, may not have been three times as efficient as another company that made only a 100% gain. In fact, the "poorer" performing company may have actually been *more* efficient in getting the most from its endowed location than many statistically top performers.

How EPS and PER Affect Market Price

Here is an example. Assume a utility is earning $1 on each share of common, and has a price-earnings ratio of ten-times. This company's stock would sell at $10 on the market. Now assume earnings-per-share and price-earnings ratio both increase 10%. What happens? Per share earnings would advance to $1.10, and price-earnings ratio would rise to 11-times. The stock would sell for $12.10—an increase of 21%.

But suppose EPS and PER both increase by 100%. In this case, per-share-earnings would climb from $1 to $2, and price-earnings ratio would rise from ten-times to 20-times. At these levels, a market price of $40 would result (20 times $2). Thus, there would be a 300% increase in market price in just ten years compared to a combined increase of 200% in EPS plus PER. A 50% increase in both EPS and PER would result in only a 125% increase in market price in ten years.

Thus, it is clear that the combined increases in both EPS and PER apply considerable leverage on the actual percentage increase in market price. Companies that increased earnings-per-share and price-earnings ratio by 100% or more would make a truly spectacular gain in market price. And that is just what happened in the Fifties for a number of companies. In one case (Florida Power & Light), market price actually shot up 925% in ten years.

Eleven Utilities Boosted Market Price More Than 250%

Listed on page 111 are the 11 utilities that turned in standout performances in market price gains during the Fifties. Market prices in this table are based on March 10, 1950, and Feb. 18, 1960, trading. This was done because these dates best reflect comparative earnings records for 1949 and 1959. Incidentally, all percentage increases in market price have been adjusted to reflect stock splits during the decade.

Market Price For 24 Utilities Jumped 150-250%

Company	Region	% Increase in Market Price*
South Carolina Electric & Gas	South	248
Michigan Gas & Electric	Midwest	231
Iowa Southern Utilities	Midwest	227
Orange & Rockland Utilities	East	226
Sierra Pacific Power	West	220
Colorado Central Power	West	219
Southern Co	South	204
Central Illinois Electric & Gas	Midwest	203
Montana Power	West	200
Delaware Power & Light	East	192
Duke Power	South	175
Central Louisiana Electric	South	175
Southwestern Public Service	Southwest	174
Utah Power & Light	West	173
American Electric Power	East	171
Oklahoma Gas & Electric	Southwest	170
General Public Utilities	East	166
Middle South Utilities	South	166
Central Illinois Public Service	Midwest	164
California-Pacific Utilities	West	161
Community Public Service	Southwest	161
Gulf States Utilities	South	161
Indianapolis Power & Light	Midwest	159
Kansas Gas & Electric	Midwest	155

*Note: Data computed from statistics collected by C. A. Turner, Chicago. * Reflects stock splits between March 10, 1950 and February 18, 1960.*

While 11 companies were standout performers, increasing market price by more than 250%, the 24 other companies in the table at the top of this page were close behind. This was the group of 24 utilities that saw their common prices climb at least 150% to as much as 250% during the decade. As in the first table, price comparisons have been adjusted to reflect stock splits over the years, and are based on the same trading dates.

Thus, we see that 35 out of 126 of the nation's utilities emerged from the decade with their common stocks selling at more than 150% above 1950 market. Of course, as pointed out earlier, some 20 companies did not have published prices extending back to 1949. They might otherwise have been included in the tabulations.

What of the other companies? How widespread were price gains in the Fifties? An analysis of the 126 companies studied reveals that 55 utilities registered gains of at least 100% during the Fifties. And a total of 79 companies made gains of at least 66⅔%. Thus, if we exclude the 20 companies without published 1949 prices, we see that *almost* 75% *of the industry* made price gains of two-thirds or more during the decade.

The most impressive feature of the tabulations, of course, is the great concentration of Southern and Southwestern companies in the standout category (250%-plus increase). Of the 11 companies that made this group, six are located in the South-

west, and four in the South. A Midwestern company was the lone regional stranger to enter this exclusive circle. And to make matters even more impressive for the warm-weather utilities, of the five companies located at the very pinnacle of the 250%-plus group, three are in Florida and two are in Texas.

In contrast to the South/Southwestern monopoly in the standout category, membership in the runner-up category (150% to 250% increase) was more widespread. Notice that the Midwestern, Eastern and Western utilities turn up in this group in substantial numbers. A regional breakdown of the companies in each group shows this distribution:

Distribution of Utilities with Biggest Price Rise (1949-1959)

	Southwest	South	Midwest	East	West	Total
250%-plus	6	4	1	0	0	11
150%-250%	3	6	6	4	5	24
Total	9	10	7	4	5	35

To make more sense from these regional comparisons we must weight them according to the actual number of companies operating in a given region. This is done in the following table. All figures are percentages of the totals shown in the above tabulation.

Comparison of Regional Performance in the Fifties–Percent

	Southwest	South	Midwest	East	West	Totals
250%-plus	55%	36%	9%	0%	0%	100%
150%-250%	12	25	25	17	21	100
% of Companies with over 150% increase	26	29	20	11	14	100
Region's percentage of all 126 utilities	8	14	35	26	17	100

Note that the Southwestern companies' performance shines still brighter viewed in relation to the meager 8% of the sample (ten in all) operating in that region. The South, of course, also made a respectable showing on this count.

By comparison, growth records of other regions look bland. But a healthy degree of prosperity can be seen in every single region. A generous proportion of companies in each region managed to boost their stock prices by *at least* 150%. For example, one out of every four companies in the West saw stock prices rise at least 150%. In the Midwest, one out of six companies did so, and in the East, one out of eight.

In weighing this market price growth in the Fifties, it is well again to consider that a great part of the upsurge was due to factors over which utilities had little or no control. One factor was fortunate location (or the lack of it). And the second factor was historical. A substantial number of companies, especially in the top performing groups, were able to register their dramatic advances partly because their stock was selling at *depressed* prices in 1949.

What of the future? Long-range forecasts indicate the growth of the past will continue in almost the same degree. So there is reasonable ground for hope that the industry and its stockholders will fare well in the Sixties. This decade may equal, or even exceed, the remarkable record of the Fifties.

Now—Gould Stationary Batteries in Plastrite Jars resist more impact than ever without damage!

They are unharmed by normal handling shocks and shipping abuse because of the high tensile strength of new lightweight Plastrite Jars—a tensile strength greater than other Stationary Battery jars.

Withstand heat without damage. Gould's new Stationary Batteries in Plastrite Jars will not warp, bulge, or lose shape. The Plastrite Jars have 50% higher elongation characteristics, 15-30% higher resistance to heat distortion than other stationary battery jars.

Same capacity, smaller size. Gould Stationary Batteries in Plastrite Jars save you 30-40% floor space . . . give you the same capacity in a smaller size battery. They are available in Planté, Calcium, and Kathanode. For more details, write today or call your local Gould Office listed "Batteries-Industrial" in the yellow pages. Gould-National Batteries, Inc., Trenton 7, New Jersey. In Canada, write to Gould-National Batteries of Canada, Ltd., 1819 Yonge Street, Toronto, Ontario.

New Stationary Batteries in Plastrite Jars offer the same long life for which Gould has always been famous

More Power to you from **GOULD**

PROPER MAINTENANCE of lighting is inexpensive and assures top efficiency of lighting systems is theory subscribed to by New Orleans businessmen

Proper Maintenance Helps Retain Revenue

E. R. TSCHIRN, Commercial Supervisor, New Orleans Public Service Inc, New Orleans, La.

Only a fraction of the commercial customers in our area properly maintain their own lighting, and another small fraction contract for lighting maintenance service. This leaves a large majority, mostly small commercial customers, with little or no plans for maintaining the efficiency of one of its most effective assets—lighting.

It was with just those customers in mind that our company recently made a survey to find out just how many burned-out lamps and tubes, and how many empty sockets, there were in our customers' places of business.

This survey was made by 11 commercial salesmen while making regular calls. They were instructed to report only empty sockets and burned-out tubes, and not to make a general search.

No attempt was made at that time to sell the customer on relamping.

The survey was extended over two separate weeks, about a month apart, in order that each man could survey different parts of his territory.

The survey revealed that in 1,251 commercial places, 177 incandescent lamps and 241 fluorescent tubes were burned out, representing 29.8 kw.

It was estimated that at least 50% more burnouts existed in other parts of the customer's premise, making a total of 44.7 kw.

A projection of these figures for all commercial customers indicated how great a need there was for lighting maintenance and emphasized the substantial loss in lighting load and revenue which results from improper maintenance.

It was also found that if a lighting system is neglected its efficiency may be reduced by dust, dirt, etc. by more than 50% in a comparatively short time. Also, as many as 27% of the tubes may be burned out.

These maintenance figures were taken from the records of Salem Inc, a lighting maintenance contractor in New Orleans covering 300 maintenance contracts. Other data revealed on the first call after the signing of the contract:

Average no. of tubes not burning	27%
No. about to burn out	31
No. with 50% life	20
No. 90% efficient	22
Ave. maintenance contract per month	$9.00
Ave. no. of tubes per contract	45

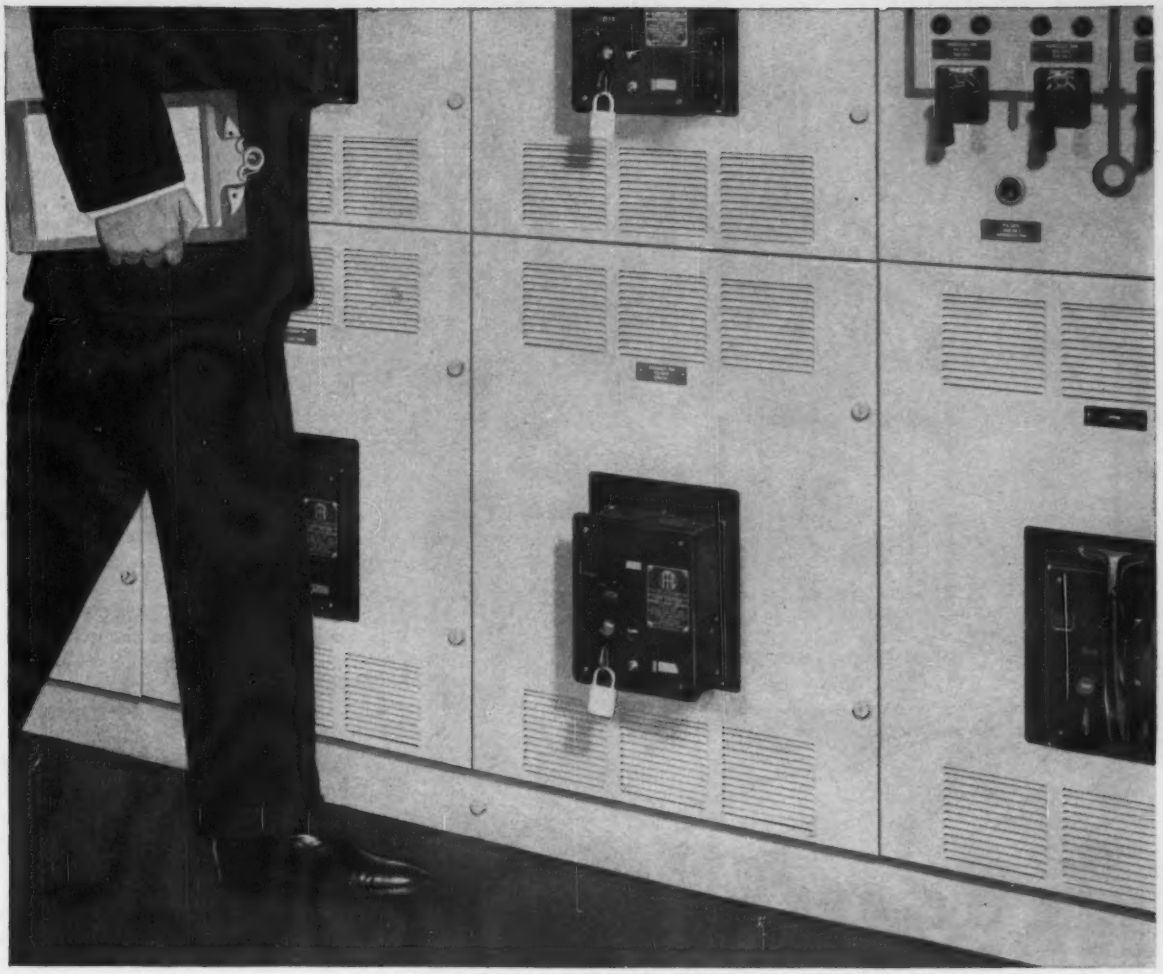
After studying these figures it was evident that without proper maintenance the outlook for a 100 ft-c job was not bright (pun intended), and the customer, contractor, lamp company and electric utility all

(*Continued on page* 118)

Two businessmen subscribe to the theory of proper maintenance of lighting.

Says J. S. Tremoulet Sr, general manager of Pontchartrain Motors Co: "Proper maintenance of lighting is inexpensive and effective. Before contracting for lighting maintenance service our lighting system was below par in efficiency and always presented a problem to keep clean and properly maintained. We are now relieved of the worry and are assured of top efficiency of our lighting system."

Marvin Rosman, owner-manager of the Security Co, a large sporting goods house in New Orleans, echoed those sentiments. "To keep at peak selling efficiency a salesman has to be in top condition at all times. Since lighting is one of my most effective salesmen, I keep it in top condition by having it maintained by a qualified lighting maintenance contractor. The results in appearance and effectiveness have more than justified the cost," he said.



Several of these circuit breakers are in the disconnected position. Yet the doors are safely closed. Wouldn't you like this feature in the switchgear you are going to live with for 20 years?

Why stumble over a circuit breaker door for 20 years?

Don't let yourself be pushed around by a 600 volt switchboard. Fight back. Insist on equipment that lets you rack the breaker out to test or disconnect position without ever opening the door . . . completely safe equipment with no live parts exposed and no open doors to admit dust (see maker's name below).

Only one make of 600 volt switchgear offers this advantage (see name below). In 1957, when this line was introduced, it was the first to give you the miracle of manual stored energy closing. Today, naturally, you expect stored energy in any make of switchgear you buy.

But only this one company (see below) offers the additional advantages of completely closed door disconnect, plus expanded range trip devices that let your breakers grow with your loads. Each trip device has three to four times the range of conventional devices. Saves both cost and downtime.

The surprise is that you pay no more for this—today's most advanced 600 volt gear. Why settle for anything else? For complete descriptive Bulletin 6004-C, write I-T-E Circuit Breaker Company, Dept. SW, 1900 Hamilton St., Philadelphia 30, Pa.

I-T-E CIRCUIT BREAKER COMPANY

REBUILDING?

General Electric offers complete line of "Factory Engineered" replacement parts

Your obsolete or burned-out distribution transformers can be made as good as new with General Electric's complete line of "factory engineered" replacement parts. In addition to renewed dependability, G-E replacement parts permit inexpensive modernization of old units—such as higher voltages and kva ratings, and the addition of self-protecting devices.

General Electric renewal parts are manufactured to new equipment standards of performance, giving you factory quality for all devices and components. You'll be able to take advantage of such modern features as Permalex* core and coils, new bushings, clamps, gaskets and protective devices.

Uprating and modernization of your existing units can be accomplished in one of General Electric's 55 Apparatus Service Shops or in your own repair shop. And you'll get "off-the-shelf," 24-hour delivery of all G-E renewal parts. You can realize real dollar savings by utilizing the many up-to-date operating advantages of G-E renewal parts. For more information, see your General Electric Sales Engineer or the Representative from your G-E Service Shop. General Electric Company, Schenectady 5, New York. 485-05

* Trade-mark of General Electric Co.

Progress Is Our Most Important Product

GENERAL ELECTRIC

Selling

(*Continued from page* 116)

stood to suffer needless losses.

The results of our survey were discussed with Pat Bordelon of Salem, Inc, and Ronald Windham of Crescent Fluorescent, two lighting maintenance contractors in New Orleans.

We proposed a plan to have our commercial salesmen extend an offer to commercial customers to have their lamps or tubes replaced by the contractor for the list price of the lamp or tube, with no other cost.

Since this service required a truck equipped differently from the one normally used for maintenance it did not seem to offer much in the way of a profit for the contractor.

However, it did offer the opportunity to contact a large number of customers interested in relamping their fixtures. Therefore, both Bordelon and Windham accepted the plan and offered their full cooperation.

The relamping activity was part of a 3-month lighting campaign last fall. Promotion consisted of mailing pieces enclosed in letters signed by our commercial sales manager and sent to 891 commercial customers, and two posters in the main office building explaining this offer.

Results:

No. of prospects turned over to contractors	207
No. of incancescent lamps replaced	107
Total wattage	32.62 kw
No. of fluorescent lamps replaced	987
Total wattage	49.02 kw
No. of maintenance contracts secured by contractors	25*

*(A total of 31 maintenance contracts were secured through our leads during this period. Twenty-five of these contracts resulted directly from the relamping activity.)

Ballasts replaced	27
Starters replaced	229
Lighting fixtures repaired	25
Broken sockets repaired	6
New outlets installed	3
Customers requesting periodic check-up (No maintenance contract)	3
Good prospects for future maintenance contracts	11

It is felt this relamping activity

offers the utility commercial salesman a new and different approach in calling on his customers. Since lighting is one service that is common to all commercial customers, our salesman can easily secure an interview and gain interest in lighting by stressing the benefits of proper maintenance and relamping.

Thus the chances of retaining present revenue, securing new business and creating good will are excellent.

We were so pleased with the results of the first relamping offer that we made it part of our spring lighting campaign. During a period of two months, 150 prospect leads were turned over to the contractors resulting in replacement of 43.1 kw of lighting.

SELLING BRIEFS

Edison Electric Institute will kick off a new campaign for **electric house heating** in the Nov. 21 issue of *Life*. Body copy includes quotes from housewives who are living in electrically heated homes, testifying on the cleanliness point. Total advertising on house heating will reach 63 insertions by end of 1961.

Electric **lamp** said to project light rays 50 miles has been developed by Duro-Test Corp and US Army Research and Development Laboratories. Extreme brilliance is provided by xenon, will be used in searchlights and projectors.

"Heat Computer" is offered by Arvin Industries, Inc, to help figure **heat loss** and cost for electrically heated homes and other buildings. Accompanying booklet shows—wattage loss for six significant areas and has charts showing outside design temperatures throughout the country and an annual degree-day map. Write Electric Heat Division, Arvin Industries, Columbus, Ind.

Arkansas Power & Light Co used one of the world's biggest light bulbs to publicize its Light For Living Exposition. Fifty-thousand-watt bulb made by General Electric Co was mounted on top of the company's building and was lighted, 15 minutes on weekdays, 5 minutes Saturday and Sunday evenings.

PARTS PRODUCED BY HARPER ***FLO-FORM***

are cold formed or hot forged from bar and wire stock with practically no waste of metal. In a completely integrated plant, Harper's controlled processes—from billet to bolt—assure quality and uniformity resulting in a better part at important savings. With an inventory of over 150,000,000 pieces in more than 100 alloys—including many specials illustrated above—Harper can fill your order today. Consult the Yellow Pages for the name of your nearest Harper Distributor.

Write today on your letterhead for FREE copy of Harper's FLO-FORM Brochure

THE H. M. HARPER COMPANY

8218 Lehigh Ave. • Morton Grove, Ill.

HARPER

Philadelphia Electric Names Watson VP

Charles W. Watson has been elected vice president-general administration of Philadelphia Electric Co.

He has been associated with the utility since 1931, following his graduation from the University of Pennsylvania as a civil engineer. His early assignments with Philadelphia Electric were in the electric generating department. Positions there included engineer of station operating, assistant administrative engineer, and superintendent of the station economy division.

In 1957 he was named assistant to the president, the position he held until his election as vice president.

CHARLES W. WATSON ▶

Ross Elected Vice President of Westinghouse Electric

Philip N. Ross, one of the pioneers in the development of atomic reactors for power uses, has been elected a vice president of Westinghouse Electric Corp.

Ross is general manager of the Bettis atomic power laboratory which Westinghouse operates for the US Atomic Energy Commission. He has been with the laboratory since it was first established in 1948.

He joined Westinghouse in 1939 in the graduate student training program, and his first assignment was with the central station engineering department at the East Pittsburgh plant.

After returning from the service in 1945 he took a leave of absence the following year to become a member of the Power Reactor Study group at Oak Ridge, Tenn.

He was named general manager of the Bettis laboratory in 1959.

◀ PHILIP N. ROSS

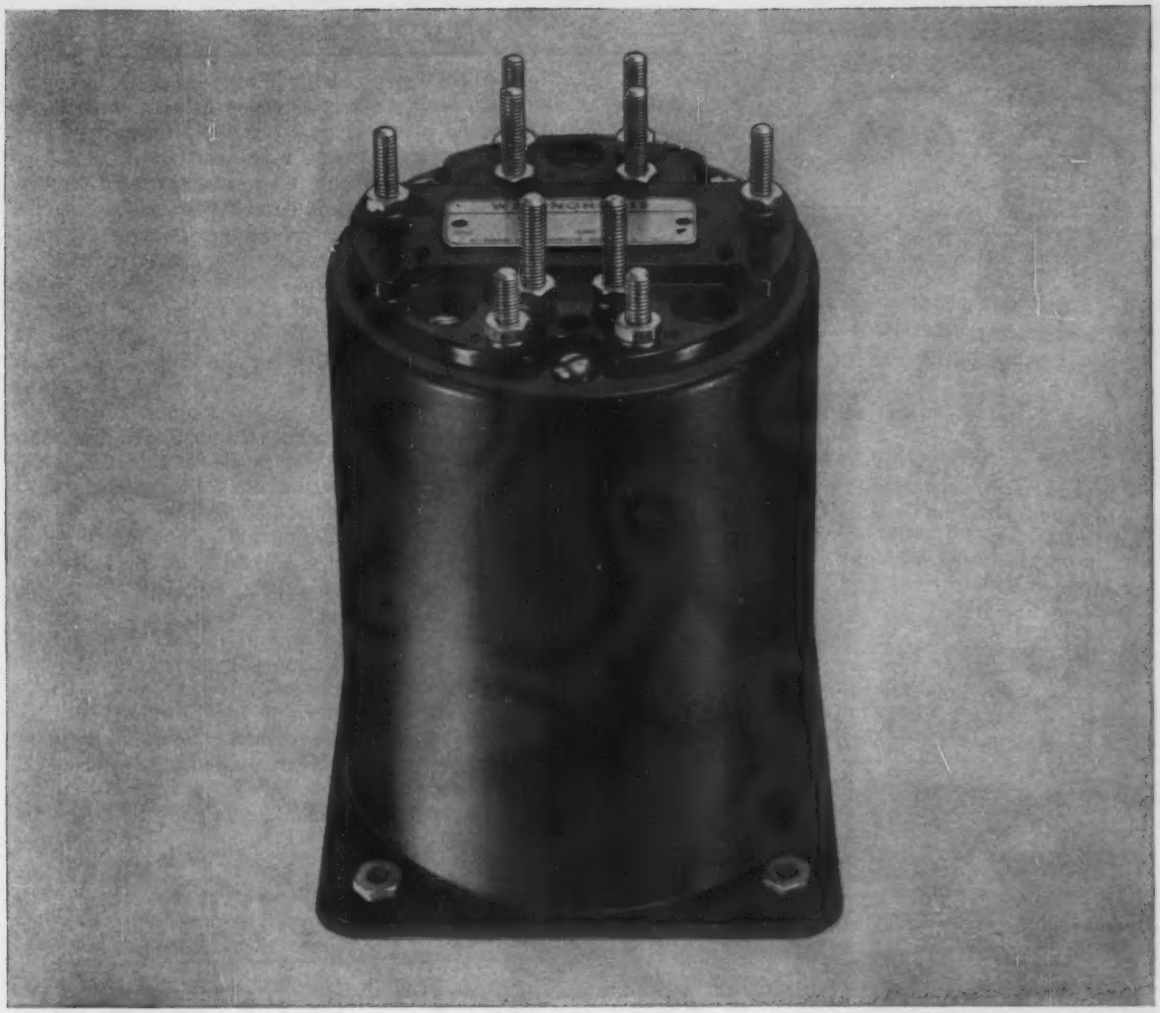
Nunlist Appointed VP-Operations

Frank J. Nunlist has been appointed to the position of vice president-operations of Worthington Corp. In his new position Nunlist will be responsible for the activities of all the company's 16 domestic operating divisions in ten states and regional engineering and service activities.

He first became associated with Worthington when the company acquired the L. J. Mueller Furnace Co in 1954. Subsequently he became executive vice president of Worthington's Mueller climatrol division. He was elected a group vice president of Worthington in 1958.

FRANK J. NUNLIST ▶

(*More News About People on page* 122)



The Westinghouse VP-840 hall generator watt transducer

No moving parts, no tubes, no thermal elements

This new transducer utilizes the Hall Effect* principle to convert single-phase or polyphase watts into d-c millivolts. In addition to the fact that this transducer gives **instantaneous response, vital to automatic control,** it offers further advantages in that it provides high overload capacity and a considerable cost saving, too.

The VP-840 is supplied for either single-phase or polyphase circuits, with or without a built-in filter. **With a filter,** it operates high-impedance devices such as telemetering transmitters, high-gain servoamplifiers, or potentiometric type recorders. **Without the filter,** it is used with low-impedance devices such as direct-acting instruments for the measurement of watts or vars or with magnetic amplifiers in systems control.

Applied with a simple conventional d-c millivolt meter, this new transducer eliminates the complex multiple coil dynamometer mechanisms previously required for the measurement of power. You can be sure . . . if it's Westinghouse.

J-40526-RB

KP-241 wattmeters and varmeters incorporate the transducer circuit in a complete instrument assembly. Watts applied to the instrument terminals are converted to a proportional d-c voltage which operates our exclusive Tau (Taut Band Suspension) d-c instrument mechanism.

For a complete rundown on this revolutionary new development, call your Westinghouse sales engineer or write for Catalog Section 43-840, Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa.

*If a conductor carries a current at right angles to a magnetic field, a charge difference is generated on the surface of the conductor in a direction which is mutually perpendicular to both the field and the current.

Westinghouse

*Trademark

"Superforms* are packaged for storeroom convenience" ...SUPERVISOR OF STORES

"The Fanner people understand our store-room problems.

"Their Superformed products are packaged right . . . well identified . . . easy to handle and store . . . don't get mixed up . . . are well catalogued . . ." and, they arrive on time.

The thousands of items that must be stocked, and *readily available*, present a tough problem for Store Room Supervisors. Fanner recognizes this, and *cooperates!*

A-1592A

FANNER
Superformed with a
"PROTECTIVE TWIST"

ARMOR RODS...
Protect long-span T&D lines at supports

LINEGUARDS...
Protect short-span T&D lines at supports

PATCH RODS...
Repair damaged conductors

TAP ARMOR...
Protects conductor at tapping points

FANNGRIPS...
For dead-ending strands and conductors

FANNSPLICES...
Join two ends of conductor wire

PLASTIC PRODUCTS...
For conductor surface protection

FANNER
The Fanner Manufacturing Co.
Brookside Park—Cleveland 9, Ohio
Division of Textron, Inc.

PERSONAL BRIEFS

Philadelphia Electric Co has appointed **Bruce Fearn** supervisor of its Philadelphia residential and commercial sales department, succeeding **Paul J. Blanc,** retired.

Central Hudson Gas & Electric Corp, Poughkeepsie, N. Y., has appointed **Ronald A. Dickson** assistant treasurer.

S. Kenneth Ledbetter has been promoted from Covina district manager's representative for Southern California Edison Co to area development consultant assigned to SoCalEd's Los Angeles general office. **F. J. Rohring** is the new manager of area development for SoCalEd.

Four senior assistant engineers at Toledo Edison Co have been promoted to associate engineers: **Stratman Cooke, Richard J. Haas, Richard M. Slaybaugh,** and **Robert V. Bins**.

Successor to the late **W. F. Thiele** as manager of power and engineering of Consolidated Water Power & Paper Co is **M. V. Molsberry.**

Appalachian Power Co has promoted **Julian C. Hansbarger** to executive assistant to the vice president and general manager, and **D. M. Miller** to executive assistant.

Norman A. Gilchrist has replaced **Vernon M. Murray** who retired as Seattle area manager of Bonneville Power Administration.

Oklahoma Public Service Co has made **Frank J. Meyer** manager of distribution and transmission facilities and assistant superintendent of operations; **W. W. Ochsner** chief engineer; and **J. M. Dyer,** manager of system engineering, has become responsible for system planning.

Arthur Kaufman has assumed added responsibility of the post of assistant general manager at Kuhlman Electric Co. He will continue as vice president and treasurer.

Thompson Ramo Wooldridge Inc has named **John Harlan Kerr** as vice president and general counsel, succeeding **Eben H. Jones** who retired, **Eugene E. Ford** as assistant general counsel, and **Paul W. Schuette** as secretary to the company, all located at the Cleveland headquarters. Also, elected to vice presidencies were **George W. Fenimore,** general manager of the international division; **Warren B. Hayes,** general manager of the Electronic Components Group; and **John H. Shaffer,** sales director, Tapco Group.

Graybar Electric Co, Inc, Vice President **R. B. Sayre** has been designated a voting trustee, while Treasurer **W. B. Whaley** became a director and member of the executive committee. Assistant Secretary and Comptroller **R. D. Paine** was promoted to secretary and comptroller, replacing **A. C. Lamperti** who retired, and **A. R. Comi** became assistant secretary.

Preformed Line Products Co has chosen **Thomas E. Sherman** to fill the newly-created post of sales engineer, serving as staff assistant to the manager of sales of Power Industry Products.

OBITUARIES

Harold Turner, 58, executive vice president of American Electric Power Service Corp . . . **Robert L. Kiddoo,** 60, formerly vice president and assistant general manager of The Empire District Electric Co . . . **Lawrence L. Wrentmore,** manager, distribution section, electric utility sales department, Westinghouse Electric Corp . . . **Woodrow W. Schaum,** 42, manager, materials and production controls department, switchgear division, General Electric Co.

Fred C. Kellogg, 63, president, Pioneer Service & Engineering Co . . . **Martin F. Schonefeld,** 58, general superintendent, Ft Wayne Division of Indiana & Michigan Electric Co . . . **Cyril R. Bloom,** 45, supervisory engineer in Allis-Chalmers Manufacturing Co's steam turbine department . . . **Pierce G. Fredericks,** 70, retired commercial vice president, Federal Pacific Electric Co.

SALES ASSIGNMENTS

COMPANY STAFFS

Graybar Electric Co, Inc, has made several district changes: C. C. Ross has become assistant district manager in Dallas; F. B. Murray, manager of the San Antonio office; and R. N. Nes has been transferred to Dallas on a special sales assignment. A. W. Hallett has been appointed manager at Allentown, Pa., replacing A. Stang Jr, who has been transferred to the Long Island City, N. Y., branch. B. G. Draper has become operating manager at Corpus Christi, Texas; D. B. Eardley, district sales manager of the northwestern district which includes Seattle, Spokane, and Tacoma, Wash., Portland and Eugene, Ore., and Butte, Montana; W. M. Pearson, manager at Chattanooga; and A. L. Nelson, manager at Salt Lake City.

Preformed Line Products Co has established an eastern area headquarters office at 1116 Kingwood Drive, Falls Church, Va., under the supervision of Fred J. Lekson.

I-T-E Circuit Breaker Co has named William D. Jameson manager of the Buffalo district office; and Daniel E. McDade, manager of the Charleston, W. Va., district office.

Hubbard & Co has named Hal J. Harris a district sales manager in the Southwest division covering New Mexico and northwest Texas.

REPRESENTATIVES

Fanner Manufacturing Co has named Smith Sales Co of Albuquerque, N. M., sales representative for its electrical products division in New Mexico and El Paso County, Tex.

Commercial Controls Corp, Electromode Division, has named Philip L. Kamerer sales representative, coordinating the sales and engineering needs of Georgia, Alabama, and northern Florida, with offices in Atlanta, Ga.

S&C Electric Co has appointed Roy E. Wilson Co manufacturers representatives in Georgia.

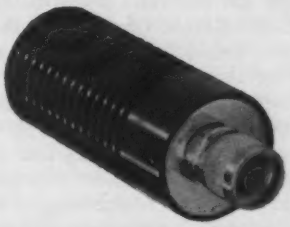
G&W Electric Specialty Co has made C. D. Binning Co manufacturers representative in lower Michigan.

Holan Corp has re-appointed Donald Rex Mansfield a sales representative after his two-year tour of duty with the Army. He will represent the company in Florida, Alabama, and Mississippi.

Look at the many different

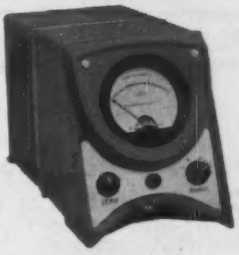
POWER MEASURING INSTRUMENTS

Sierra offers you now



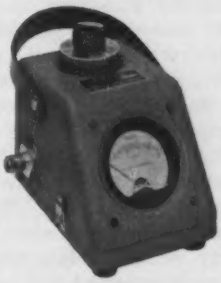
Model 160 50 ohm Coaxial Loads

Now including Models operating to 11 KMC, Sierra 160 Series low VSWR terminations may be used when stable 50 ohm loads are required. Featuring rugged design, high stability at full rated power, the loads have a typical VSWR of 1.2. All models are air-cooled and complete shielding insures personnel safety. Models with power capacities of 1, 5, and 20 watts are available with N, C and BNC connectors. 100 and 500 watt models Type N connectors. $20.00 to $170.00



Model 185A Average-Reading Termination Wattmeters

Sierra 185A series are particularly useful in terminating rf coaxial transmission systems, measuring average powers between 20 and 1,000 MC, and as dummy loads for testing and adjusting CW and FM transmitters and oscillators. Three models with maximum power dissipation of 15, 100 and 500 watts, and power ranges of 0 to 5/15, 0 to 30/100 and 0 to 150/500 watts, respectively. Accuracy is ± 5% and VSWR is 1.2. Female Type N connectors. Model 185A-15FN, $170.00; 185A-100FN, $260.00; 185A-500FN, $315.00.



Model 164A Average Power Monitor

Sierra 164A Series Bi-Directional Power Monitors are now available with plug-ins down to 2 MC. Four plug-ins provide full scale ranges of 1, 5, 10 and 50 watts through frequencies 25 to 1000 MC. Two medium-power units provide full scale ranges 10, 50, 100 and 500 watts, 25 to 1000 MC. Two high-power units provide full scale ranges of 50, 100, 500, 1000 watts, 2 through 75 MC. Model 164 is now available with Type N, C, HN, UHF and LC connectors. Model 164, $115.00; plug-ins, $70.00 to $170.00.

Model 194A-A Bi-Directional Peak Power Monitor

Covering 200 to 1,215 MC, Sierra 194A-A Peak Power Monitor offers two important, time-saving features—peak power is read directly without computation and a reversible directional coupler permits incident or reflected power readings simply by turning one knob. Peak powers to 30 Kw are covered in 4 ranges. Measurement accuracy is ± 10% full scale at pulse widths down to 0.1 μsec or repetition rates as low as 10 pps. Minimum duty cycle 0.04% for specified accuracy. $460.00.

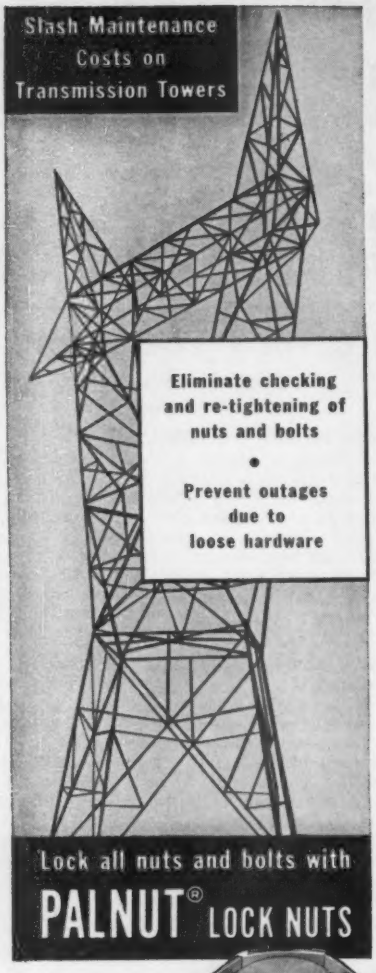
Data subject to change without notice.
Prices f. o. b. factory.

For complete details, see your Sierra Representative or write direct.

SIERRA ELECTRONIC CORPORATION
A Division of Philco Corporation

6562W Bohannon Drive • DAvenport 6-2060 • Menlo Park, California, U.S.A.
Sales representatives in all principal areas.

Canada: Atlas Instrument Corp., Ltd., Montreal, Ottawa, Toronto, Vancouver.
Export: Frazar & Hansen, Ltd., San Francisco, California.


Slash Maintenance Costs on Transmission Towers
Eliminate checking and re-tightening of nuts and bolts
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Prevent outages due to loose hardware
Lock all nuts and bolts with
PALNUT® LOCK NUTS
Applied in seconds—
Stay tight for life
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PALNUT Lock Nuts are the lowest-cost, most reliable method of assuring permanently tight tower bolts, for these reasons:

- **Vibration-proof.** Unfailing double-locking spring action holds assemblies to original tightness.
- **Easy, fast assembly.** Light in weight, easily carried, free-spinning, quickly lock with ¼ to ½ turn of linesmen's wrench.
- **Weatherproof.** Heavily galvanized to equal or exceed ASTM specs. Still perfect after 30 years' service on many towers.
- **Low cost.** PALNUTS cost a trifle more than one cent in average sizes.
- **Small Space.** Need only 3 bolt threads.

Specify PALNUTS on all new towers —add them to existing towers. Send for Free Samples and data

THE PALNUT COMPANY
Division of United-Carr Fastener Corp.
51 Glen Road Mountainside, N. J.

What Price Peaking Capacity?

(*Continued from page* 90)

tions, there is little or no economic incentive to install peaking generation. Where the optimum size unit addition is in the vicinity of 75 Mw, all types of peaking capacity considered offer some economic gain.

Fuel costs vary throughout the United States. However, 30-60-90¢/million Btu cost for coal, gas and oil respectively is typical of many areas. In any case there can be considerable variation in the relative costs of coal, gas and oil without materially changing the economic situation as presented in Table 2. For example, if we assume a cost of 30¢/million Btu for all three fuels, the total annual costs for a 250-Mw base load steam unit, gas turbines and package diesels would be $43.30, $43.90 and $44.00, respectively. These lower annual cost figures still do not indicate an economic incentive for installing peaking generation as opposed to a 250-Mw steam unit.

IJC Aims for Final Report On 'Quoddy by End of Year

A final recommendation—yes or no—on the Passamaquoddy Tidal Project moved a little closer last month, as the International Joint Commission reached general agreement on the detail and scope of subjects to be covered in its report.

IJC is hoping for a final recommendation on the project by the end of 1960; and the US section of IJC hopes to submit its first draft by middle or late November. The Canadian section will make suggested revisions at another meeting, possibly in Washington late this month.

Some of the major problems to be discussed include: **(1)** disparity of interest rates between the US and Canada and how they affect economic feasibility, **(2)** whether 'Quoddy should be considered separately, or also as part of a "package" including Rankin Rapids Project, **(3)** whether 'Quoddy could be built jointly by the US and Canada, or whether the US might, under some formula, build the project alone, with construction costs and power benefits divided with Canada.

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Study Points Up Public Fears on Atom

Cherchez la femme may be the password to better public acceptance of the investor-owned utilities' role in atom power. That, at least, is one of the inferences that could be drawn from a nation-wide survey of public opinion on peaceful use of nuclear power recently made by the General Electric Co.

Why look for the woman? Because the survey indicates that women, who now comprise the majority of voters, are less favorable to private power atomic development than men are and are more reluctant to see the atom used to produce power. Moreover, on some questions, all non-technical, as many as 40% of the women were undecided or had no opinion.

Here are a few sample statistics that point up the problem:

• About 39% of women favor government development of atom power (for peaceful purposes), while only 20% picked private power as the preferred developer. Another 17% said both should participate and 24% had no opinion. In contrast, the men surveyed split evenly, with 30% favoring only government action and 30% only utility action. Only 12% of the men had no opinion.

• Although 70% of the men said they would react favorably to having an atom plant in their city, only 47% of the women agreed with them. In the group questioned in the survey, almost twice as many women (28%) as men (15%) were undecided.

• Only 52% of the women thought atom power should be used to produce electricity, although 73% of the men were in favor of it.

• Only 57% of the women, as opposed to 76% of the men, would react favorably to having their household electricity supplied from an atom plant.

There were other dismaying returns for utility men. Although 60% of the total respondents thought Congressional and federal government leaders had "quite a bit" of knowledge about atomic energy, only 56% gave a similar estimate of public utility knowhow, and only 28% thought manufacturers were similarly informed.

Asked where they would go to get more information on atomic energy, 22% said the library; 19%, a government agency; and only 7%, private industry.

The nationwide sample included 1,500 households.

59-Mw License Sought

Nevada Irrigation District of Grass Valley, Calif., has filed for a Federal Power Commission license for its proposed $36,825,000 Yuba-Bear River Development which would have two powerhouses with a 59,100-kw combined capacity. Power generated at the Irrigation District's project, in three California counties, would be sold to Pacific Gas & Electric Co.

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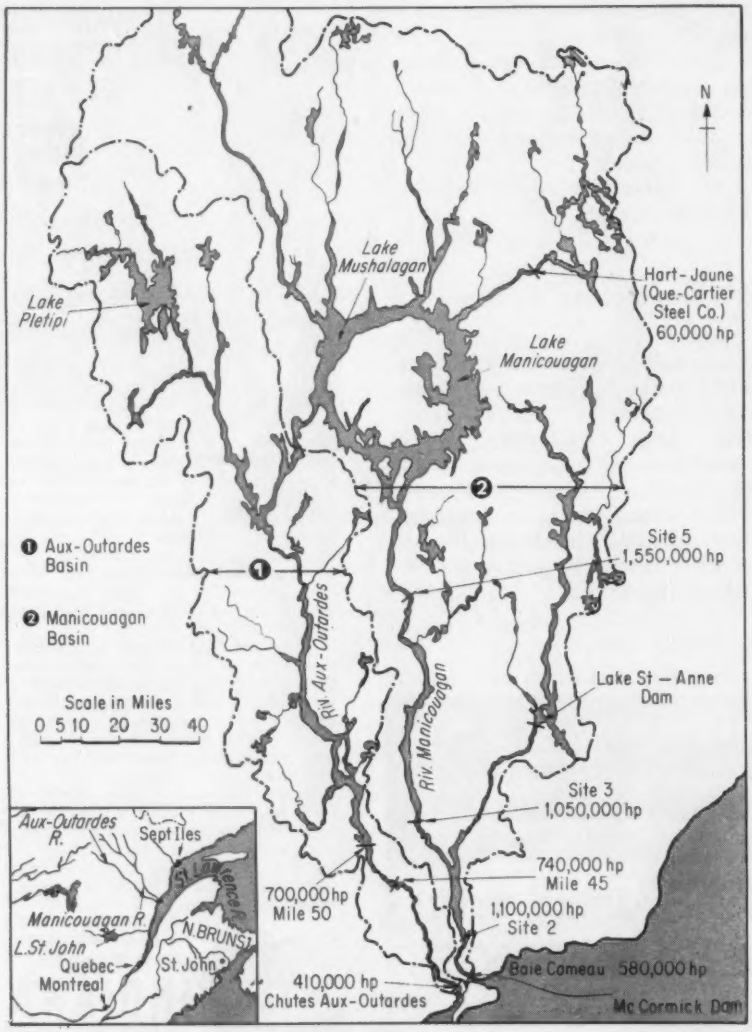
New Hydro Project in Quebec Wilderness Will Provide 6 Million Hp

LONGEST BUTTRESSED, MULTI-ARCH DAM uses 2.5 million cubic yards of concrete, two-thirds less than gravity dam

Two little-known rivers flowing from the north into the St. Lawrence —the Manicouagan and the Aux-Outardes—will contribute about 6 million hp to meet Quebec's power needs when completed by the Hydro-electric Commission of Quebec.

The project involves three major sites on the Manicouagan, realizing about 3,700,000 hp, and two sites on the Aux-Outardes, providing an additional 1,440,000 hp. Also, regulating these rivers will substantially increase the capacity of two existing developments. The Manicouagan Power Co's McCormick Dam plant on the Manicouagan could raise its capacity from 110,000 to 580,000 hp, and the Quebec North Shore Paper Co plant on the Aux-Outardes (Chutes Aux-Outardes) can be increased from 70,700 to 410,000 hp.



PROJECT WILL LINK two watersheds, create an 800-sq-mile reservoir behind major Manicouagan Dam (Site 5). Rivers are over 500 miles from Montreal

The major Manicouagan dam (Site 5) will be a short distance below the outlet of Lake Manicouagan. The site, 125 miles northwest of Baie Comeau, is 470 air miles and 554 highway miles from Montreal.

Main feature of the Manicouagan development will be the most massive concrete dam of its type in the world—4,000 ft long and 650 ft high. The dam, a buttressed, multi-arch type, will be 600 ft thick at the central part of the base, and will require about 2.5 million cubic yards of concrete. This is about a third the amount needed for conventional gravity-type dams.

The dam will create an 800-sq-mile reservoir capable of holding about 5,000 billion cubic ft of water. It will be among the largest in the world, ranking with the Salto de Aldesdavilla watershed in Spain and the Kariba project on the Zambesi River in Southern Rhodesia.

Dam construction will take eight years and filling the reservoir, another eight. Held 50 ft below the height of the dam, the level of the accumulating water will rise apace with dam construction, reservoir filling, and powerhouse construction. When full, the reservoir will be 1,180 ft above sea level.

The supports of the main arch

will be 450 ft apart, and those of other spans will be 295 ft apart. The power plant will be incorporated in the base of the main arch and will contain eight generating units of about 200,000 hp each. This 1,550,000-hp powerhouse, to be known as Manicouagan 5, will receive its energy from a 505-ft water-head.

At Site 3, 50 miles from the mouth of the river, seven generating groups of 150,000 hp each will be contained in the Manicouagan powerhouse. Here a rockfill dam will hold back about 350 billion cubic ft of water 675 ft above sea level. Turbines will operate under a 310-ft head in an underground powerhouse.

Manicouagan 2, about ten miles from where the Manicouagan enters the St. Lawrence, will have an outdoor powerhouse containing ten generating groups of 110,000 hp each. The upstream and downstream elevations will be 365 and 125 ft respectively, providing a 240-ft head.

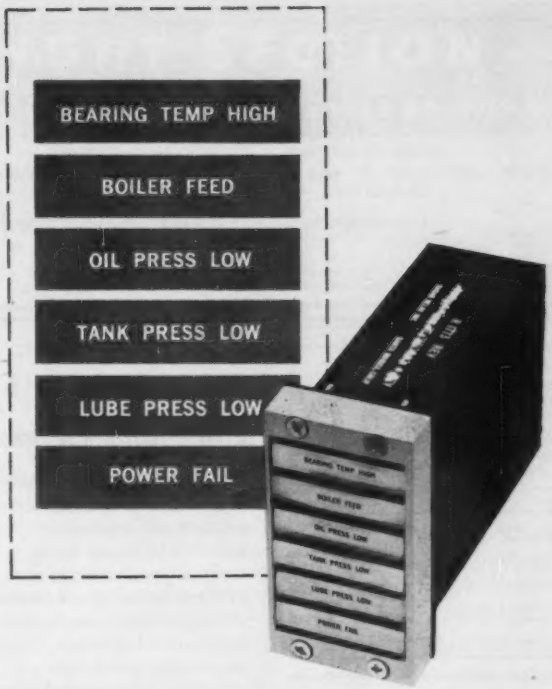
Two years ago, Hydro-Quebec completed access roads to the proposed construction and a reservoir on Lake St. Anne (on the Toulnoustouc River, a tributary of the Manicouagan) which permits regulation of the lower Manicouagan.

Projects to Produce 1,440,000 Hp

On the Aux-Outardes, surveys have indicated that important developments are justified at Mile 58 and Mile 45 (distances from junction with the St. Lawrence). The Aux-Outardes 58 generating station will have 700,000 hp under a 425-ft head. A storage dam will create a reservoir with 650 billion cubic ft of water 1,150 ft above sea level.

Also operating under a 425-ft head (dropping from 725 to 300 ft) the Aux-Outardes 45 plant will have a 740,000 hp installed capacity.

Meanwhile, in another development, on the Hart-Jaune River (a tributary of the Manicouagan) the power plant for Quebec Cartier Mining Co's $300-million mining project is expected to begin operating at full 60,000-hp capacity this month. Three 20,000-hp units were installed at one-month intervals in the plant on the Hart-Jaune, 12 miles from the mine. The project is considered a major achievement, since bids were not called until the end of May, 1958.



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• **National Electrical Manufacturers Association**—Industrial Equipment Division, Building Equipment Division, Generation, Transmission, and Distribution Equipment Division, Hotel Traymore, Atlantic City, Nov. 13-16; Insulating Materials Division, Westchester Country Club, Rye, Nov. 15; Lighting Equipment Division, Waldorf Astoria Hotel, Nov. 16; Annual Meeting, Savoy Hilton Hotel, New York City, Nov. 17; Wire & Cable Division, Seaview Hotel, Absecon, N. J., Nov. 20.

Edison Electric Institute — Accident Prevention Committee, Statler Hilton Hotel, New York City, Nov. 14-16; Area Development Workshop, Park Plaza Hotel, St. Louis, Nov. 15-16; Commercial Cooking and Water Heating Committee, New York City, Nov. 16-17; Electric Space Heating & Air Conditioning Committee, Charlotte, N. C., Nov. 21-22; Electronics Seminar, Claridge Hotel, Atlantic City, Nov. 28-30; Street & Highway Lighting Committee, Cincinnati, Nov. 30-Dec. 1.

American Institute of Electrical Engineers—Sixth Annual Conference on Magnetism and Magnetic Materials, Hotel New Yorker, New York City, Nov. 14-17.

Southeastern Electric Exchange — Sales Section Conference, Henry Grady Hotel, Atlanta, Georgia, November 16-18.

Canadian Electrical Association—Engineering Sections, Western Zone, Saskatchewan Hotel, Regina, Sask., Canada, Nov. 17-19; General & Sales Sections, Western Zone, Palliser Hotel, Calgary, Alta., Canada, Nov. 21-23.

Tennessee Valley Public Power Association — Distribution Practices Section Meeting, Andrew Jackson Hotel, Nashville, Nov. 18-19.

Public Utilities Association of the Virginias—Executive Committee, Hot Springs, Nov. 19.

Electric Companies Public Information Program—Inter-Regional Committee, Detroit Leland Hotel, Detroit, Nov. 22.

American Society of Mechanical Engineers—Annual Meeting, Statler Hilton Hotel, New York City, Nov. 27-Dec. 2; 24th National Exposition of Power & Mechanical Engineering, Coliseum, New York City, Nov. 28-Dec. 2.

• **National Association of Railroad & Utilities Commissioners**—Annual Meeting, Stardust Hotel, Las Vegas, Nevada, Nov. 28-Dec. 1.

• **American Institute of Consulting Engineers**—Annual Dinner, Waldorf Astoria Hotel, New York City, Nov. 29.

DECEMBER

• **Edison Electric Institute**—Industrial Power & Heating Group, Clearwater, Dec. 1-2; Residential Appliance Promotion Committee, Cleveland, Dec. 1-2; Commercial Lighting Committee, Philadelphia, Dec. 5-7; Industrial Relations Committee, Roosevelt Hotel, New York City, Dec. 8; Residential Electric Heating & Air Conditioning Committee, Cincinnati, Ohio, Dec. 15-16.

• **National Conference on Application of Electrical Insulation**—Conrad Hilton Hotel, Chicago, Dec. 5-9.

• **Interstate Power Club**—Beverly Hotel, New York City, Dec. 12.

• **American Nuclear Society**—Winter Meeting, Mark Hopkins Hotel, San Francisco, Dec. 12-15.

• **National Safety Council**—Fall Meeting of the Executive Committee, Public Utilities Section, Statler Hotel, New York City, Dec. 13-14.

• **Eastern Joint Computer Conference**—New Yorker Hotel and the Manhattan Center, New York City, Dec. 13-15.

• **Atomic Industrial Forum**—Annual Conference, Fairmont Hotel, San Francisco, Dec. 14-16.

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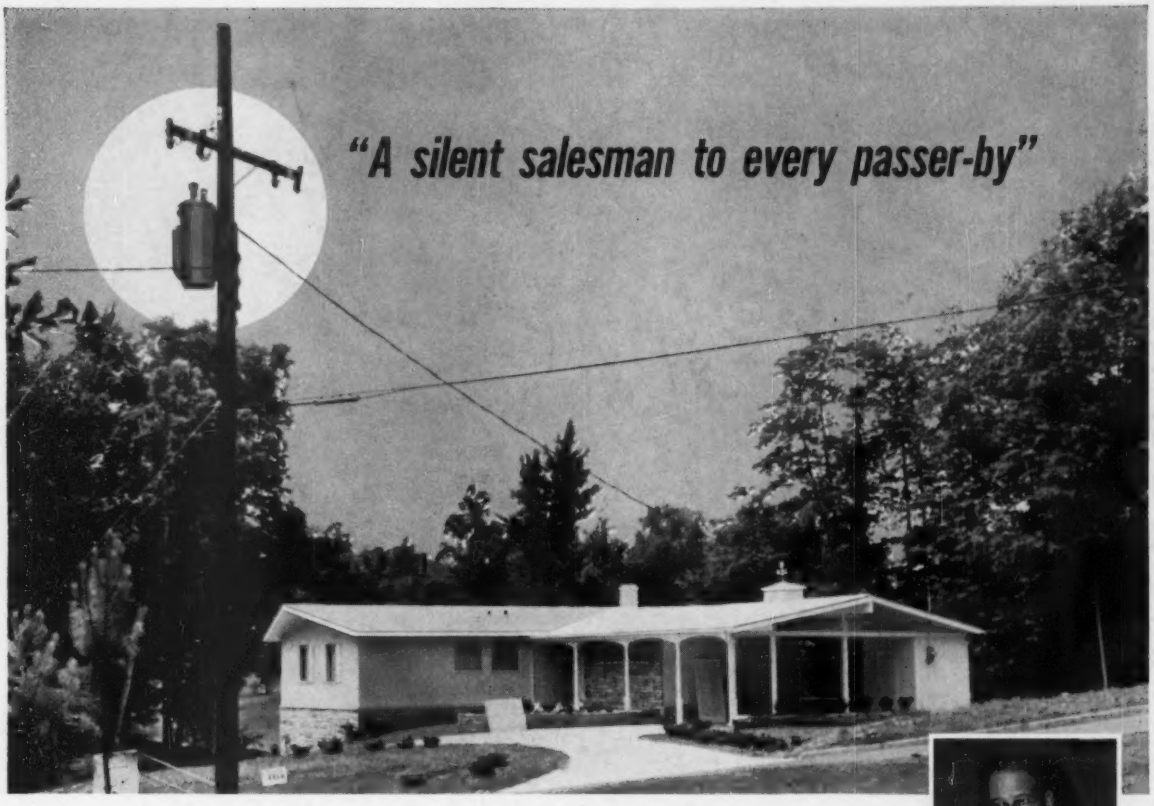

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